

UC-NRLF



B 3 126 377

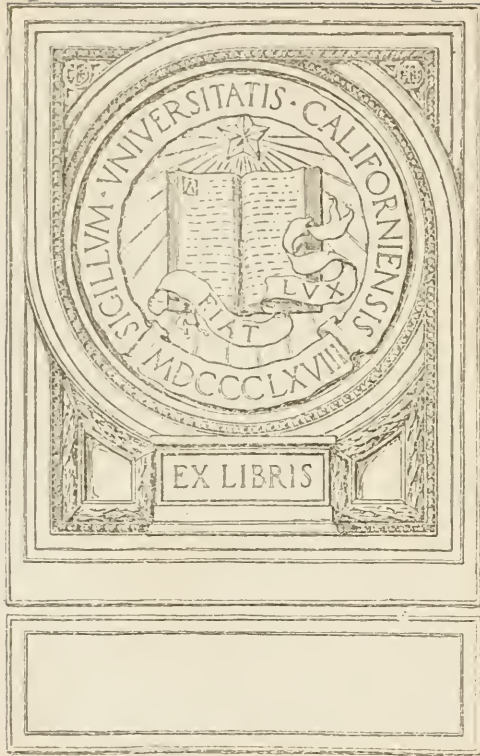
NEOLITHIC
DEW PONDS AND CATTLE WAYS

BY

ARTHUR JOHN HUBBARD, M.D.

AND

GEORGE HUBBARD, F.S.A., F.F.I.B.A.



NEOLITHIC
DEW-PONDS AND CATTLE-WAYS



Digitized by the Internet Archive
in 2008 with funding from
Microsoft Corporation

UNIVERSITY OF
CALIFORNIA

NEOLITHIC DEW-PONDS AND CATTLE-WAYS

BY

ARTHUR JOHN HUBBARD, M.D.

AND

GEORGE HUBBARD, F.S.A., F.R.I.B.A.

WITH ILLUSTRATIONS

THIRD EDITION

LONGMANS, GREEN AND CO.

39 PATERNOSTER ROW, LONDON

FOURTH AVENUE & 30TH STREET, NEW YORK

BOMBAY, CALCUTTA, AND MADRAS

1916

All rights reserved

PREFACE TO THE SECOND EDITION

FEW things can be more interesting to the traveller than to survey, from some elevated spot, the road by which he has journeyed, and to observe its course as it winds away in the distance and is lost on the horizon. It is an interest of a similar character, only immeasurably greater in degree, which we experience in looking back to the horizon of time and examining the works that remain to us of the earliest civilisation in our land.

The road behind us is dim, and the traces which our far-away fathers have left upon the hills and plains of England are so multitudinous, and yet so little understood, that it is necessary to make use of certain definitions and limitations of the subject, if we are to arrive at any conclusions which shall be at once accurate and intelligible.

First, let us say that for the purposes of this work we use the word "neolithic" as a general term, applicable not only to stones bearing the imprint of a certain style of workmanship, but to all the works done by the earliest men of whose lives we can find traces, and also to the workers themselves. Palæolithic man is below the horizon.

Preface to the Second Edition

The human interest of this wider aspect of the subject far transcends the attractions of flints and sherds in a museum. It is true that the chipped or polished surface of the stones, and the outlines of the pottery, not only show manual dexterity, but bear witness to the nature of the life which was led by the workers. This evidence is, however, only subsidiary to the greater testimony of plain and hill.

Next, although the traces of the work done by neolithic man are probably to be found over the greater part of the world, we shall limit ourselves to our own doorstep, where the interest is most immediate.

Even when thus restricted geographically, we find that we are gazing into a profundity of time which is scarcely to be measured in centuries. When we consider that to follow the will-o'-the-wisp which we call progress, is of the essence of man's contract with things in general, we perceive that it would be unreasonable to regard this vast period as one, or to assume that considerations applicable to one of its epochs will be applicable to all. Again we must limit ourselves.

Two stages only can be defined. Of these the earlier may be called the Hill-period, and the later the Plain-period. The demarcation is fairly distinct, in spite of the fact that the diverse remains of the two periods frequently occur in the same neighbourhood.

The men of the earlier period were earthworkers, those of the later period, stoneworkers. The former

Preface to the Second Edition

were concerned only with the primitive necessities of life, and their settlements, built of earth, are of the earth, earthy, and the purpose of every part of them is purely utilitarian. The latter, as at Avebury and Stonehenge, built vast sun-temples in the open country, and showed great mechanical skill in moving and setting up the ponderous rocks which now form their monuments.

It is quite otherwise in the Hill-period—that earlier time to which the present work will be limited. On the downs we find that the dominating idea of the hillmen was terror of the plains, which had become habitable in the later period. But, before we may pursue the subject further, we must justify ourselves in daring to describe, even in general terms, a life so far removed from our own.

It is necessary to bear in mind that we are dealing with works which were executed on the downland, and that there, when once the chalk has been scored, or an embankment built, the seal that has been set is imperishable, unless man himself again comes to destroy his own handiwork. In wooded lands the falling and decaying leaves will in time reduce all to the same dead-level; in cultivated land, ploughshare and worm are constantly transforming the surface; in a loose soil the drifting sand will in time fill up the hollows; on the mountain-side the storms and streams destroy, and on the lowlands the floods obliterate the records. But, on the uplands of the downs, man's

Preface to the Second Edition

work is practically everlasting. There, the ever-renewed mantle of short, dense turf spreads itself over the surface, moulds itself to every detail, and reproduces in its green outlines the forms which were graven in the white chalk below. Egyptian sand has not been more faithful to its trust; and the English turf has preserved for us the record of a forgotten civilisation, whose works are to be seen, league after league, upon the downs.

We cannot assign a date to these earthworkers of the Hill-period. One of our furthest landmarks in point of time is at Stonehenge, but there we find that the stones are shaped, and morticed and tenoned, though there is no evidence of any metal tool having been used upon them, and we see that the earthworks in connection with the stones of the temple are comparatively insignificant. We are indebted to Sir Norman Lockyer for the fact that we may say with much certainty that the date of Stonehenge is within two hundred years of either side of B.C. 1800.

Avebury, another great temple in a plain, is older, for the stones are unshaped, and the earthworks are immense. We do not know by how much Avebury is the older of the two; but even there, immense though the earthworks are, they seem to have lost their significance as works of defence. The trench and embankment are not in their usual position with regard to one another. The trench is not on the

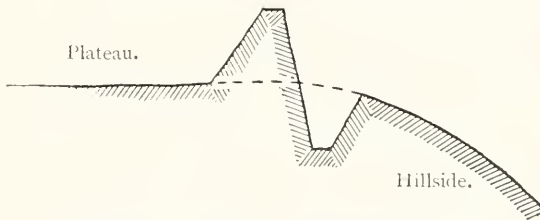
Preface to the Second Edition

outside—the side exposed to attack—as it is in all the other works with which we are acquainted, but on the inside, nearest to the temple.

The days of the hill settlements—of the terror of the plains—must be far away from the days when men worshipped on the levels of Avebury. How far back we cannot say; perhaps the time should be measured in thousands of years.

The larger earthworks of this period may be divided into two well-defined forms.

First, and most striking in appearance, is the embankment and trench, thus in transverse section :



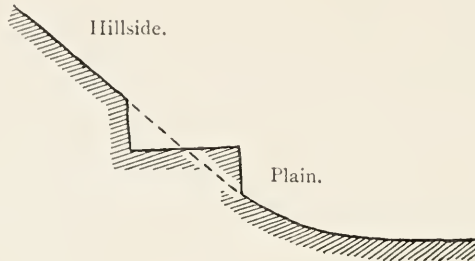
The dotted line shows the natural outline of the hill.

This form is generally found at a considerable elevation, on the crest of a hill, and the breastwork was evidently designed as a defence against an enemy who used projectiles.

The second form, less commanding in appearance, is far more frequently to be seen, and is usually at the base of a hill on the edge of a plain. It is not too much to say that in most unploughed valleys running up into the downs we shall find this second form of defence. In the aggregate, hundreds of miles

Preface to the Second Edition

of it must still remain. Here there is no breastwork, but only a simple platform generally constructed thus, as shown in transverse section, and several such platforms are often to be found one above another. They vary greatly in size, but very frequently show a rise



The dotted line shows natural contour of ground.

of sixteen or twenty feet, and have a level platform of twenty to thirty feet in width. In Wiltshire they are sometimes known as “The Shepherd’s Steps.”

They are not a natural formation. They are not neolithic cultivation areas such as may be seen above Eastbourne or near Avebury. They are generally constructed only just above level ground, and without any regard to aspect, but cunningly planned to occupy the most advantageous positions against an enemy advancing from the plain.

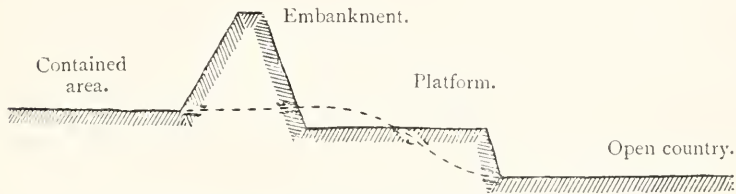
But they have no breastwork; they were not designed against a foe who used projectiles. Our fathers laboured upon these platforms, here, there, and everywhere, because of their terror of the plains.

Who was the enemy in the plains? Who was the

Preface to the Second Edition

foe that used no projectiles, and was best met on the lip of a level platform?

We shall find that the answer to this question is given to us at Poundbury Camp, near Dorchester. Part of the earthworks which form the defences show a combination of the two forms which we have hitherto described, the platform taking the place of the trench, thus in transverse section :



The dotted line shows the natural contour of ground.

Poundbury Camp was the cattle station in connection with the huge encampment called Maiden Castle, with which it is connected by a well-marked neolithic road, and is situated in comparatively open country near Dorchester. We know of no other example of this combination of the two forms of defence, and we infer that it was more especially the herds which had to be protected by the level platforms—against, that is, the foe who used no projectiles, and who lived in the wooded plains.

This foe was the Wolf. The wolf, seeking his prey in the neolithic herds, was the compelling influence which drove man into the uplands, and led him to expend such an infinitude of labour on the “shepherd’s

Preface to the Second Edition

steps" which mark off the bases of the hills wherever we find the traces of our neolithic forefathers.

These level wolf-platforms were of necessity placed as far away from the camp as possible, to avert the stampeding of the cattle in the night. If the wolves had got near to the cattle-compound, and still more, had a wolf-fight, with its noise and flames, taken place in the immediate neighbourhood of the herds, a stampede would pretty certainly have resulted.

Keeping in mind the grey forms flitting through the night, we can grasp the significance of the other works which we find upon the downs; the secular contest with the wolf furnishes the key to the enigma.

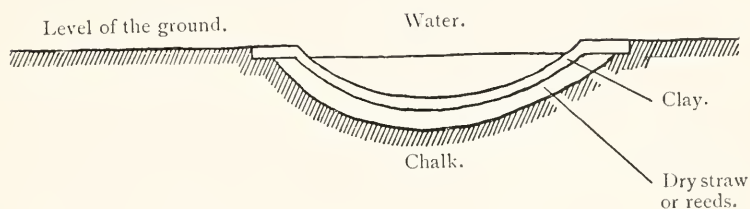
Of all the lesser works upon whose significance we are now able to throw a new light, the most interesting and the most important is the Dew-pond. We have in the text endeavoured to show that certain dew-ponds are neolithic structures, and it is evident that the upland country, devoid as it is alike of streams and springs, would have been uninhabitable by neolithic man had he not been able to secure an artificial supply of water.

He was not the master of a supply from the lowlands—the lowlands were held by the wolf—and all through the winter his herds must needs be kept in camp on the uplands. Without an unfailing supply on the hill-tops, life was not possible to him, and perchance there was a time when the habitability of this country depended upon a solution of the problem of securing it.

Preface to the Second Edition

The very ingenuity of the means by which he succeeded shows how desperate was the need.

We now give a transverse section of a dew-pond.



We have in the text discussed the thermo-dynamics of this structure, which, as constructed by neolithic man, could only be successful on the chalk. The subject is a large and important one, and by no means exhausted. As to whether or no there was indeed a time when the habitability of this country depended upon this device—that is as it may be. But we are convinced that the habitability of large tracts in this planet, now desolate, depends to-day upon the adoption of some scientific modification of this neolithic device. Over a thousand sheep may be watered daily at one dew-pond when it is in good working order, and every morning finds it replenished.

We are uncertain as to whether the tumuli and barrows ought to be referred to the Hill-period or the Plain-period. Possibly the barrows belong to the former and the tumuli to the later period. In any case, the wolf dominates even the mode of sepulture which was adopted for the dead. The dead were placed under a mound which was sufficient to protect

Preface to the Second Edition

them, and there is also much evidence which goes to show that cremation was widely practised.

We beg to acknowledge our indebtedness to the Editor of the *Cornhill Magazine* for his kind permission to make use of an article which we contributed under the title "Prehistoric Man on the Downs."

112 FENCHURCH STREET, E.C.

1907.

PREFACE TO THE FIRST EDITION

IN dealing with the subject of Prehistoric Man, it is impossible to speak definitely, owing to the absence of all historic records. The chief evidence of his existence is to be found in the great earthworks he constructed, and the implements he formed out of flint. It may be safely assumed that Prehistoric Man was immeasurably more exposed to attack from the animal world than his successors are to-day; and if one always bears this fact in mind, some satisfactory explanation may be found of the earthworks he constructed around his settlements, which in many cases extended for several miles from the centre of his habitation.

At the time when Prehistoric Man constructed the gigantic earthworks of the Downs in the south of England—for example, those at Cissbury, near Worthing, and Maiden Castle, near Dorchester—he had probably not discovered the art of building; but, with an infinity of patience and labour, he piled up his great earth embankments and scraped out his trenches

Preface to the First Edition

or "valla," behind which works he lived and defended himself, certainly against his animal assailants, and probably against his human antagonists.

It is not known at what period these earthworks were constructed, but they probably date to a time long prior to the building of Stonehenge, which may be taken with approximate accuracy at 1800 B.C. Cissbury and Chanctonbury would therefore be far older; possibly they are 4000, perhaps 6000, years old. The latter date would make them contemporary with the Pyramid Age in Egypt.

It should be remembered that these great earthworks were constructed without the assistance of any tools made of metal. The only surviving specimens of such tools as man then employed are the rough implements he fashioned out of flint, or constructed from the antlers of the red deer, like those found in the flint mines sunk in the chalk at Cissbury years ago, and investigated by General Pitt-Rivers and others.

Flint implements may still be picked up on the surface at Cissbury. One we found, whitened by exposure, has the appearance of being of the Palæolithic period; but it more probably belongs to the Neolithic.

Sir John Evans is of opinion that a regular manu-

Preface to the First Edition

factory of flint implements was carried on at Cissbury, and that some of the depressions in the ground to which we shall afterwards refer were entrances to the old workings of flint quarries. Though the surface of the ground is strewn with flints in all directions, the quality of the flints on the surface was not, he thinks, considered suitable for implements by Neolithic Man.

No doubt some of the depressions or sinkings in the ground were entrances to the old workings, but we are of opinion that the smaller cup-shaped depressions represent the sites of Neolithic Man's dwellings.

To these we shall refer more particularly when describing that settlement of Neolithic Man which comprised Cissbury Ring and Chanctonbury Ring.

85 GRESHAM STREET, E.C.

1904.

CONTENTS

	PAGE
I. CISSBURY RING AND CHANCTONBURY RING	1
II. MAUMBURY RINGS AND MAIDEN CASTLE	28
III. CATTLE-TRACKS	51
IV. ST. MARTINSELL HILL	72
V. THE DEVIL'S DYKE, NEAR BRIGHTON	83
VI. MALVERN	87
VII. FIRLE	97
VIII. WILLERSEY HILL	104
IX. DEW-POND EXPERIMENTS	109

LIST OF ILLUSTRATIONS

	PAGE
I. DRIED-UP DEW-POND NEAR CISSBURY, FORTIFIED BY A SURROUNDING DITCH AND EARTHEN WALL	4
II. NEOLITHIC ROADWAY LEADING TO SOUTHERN FACE OF CISSBURY RING	5
III. ANOTHER VIEW OF THE SAME NEOLITHIC ROADWAY IN THE FOREGROUND. THE TERRACES ON THE OTHER SIDE OF THE VALLEY MAY BE SEEN FROM THIS POSITION	7
IV. VIEW OF INNER AND OUTER EMBANKMENTS AT CISSBURY RING	9
V. DEPRESSION MARKING THE SITE OF A GUARD-HOUSE JUST OUTSIDE THE SOUTHERN ENTRANCE TO CISSBURY RING	11
VI. CLEFT IN THE OUTER RING AT CISSBURY AT A POINT OVERLOOKING THE TERRACES	13
VII. EASTERN ENTRANCE TO CISSBURY RING SHOWING TRACES OF RECTANGULAR GUARD-HOUSES	15
VIII. CATTLE-WAYS LEADING DOWN TO DEW-POND AT THE NORTH OF CISSBURY RING	16
IX. THE LOW EMBANKMENT ENCLOSING AN AREA OF LAND BETWEEN CISSBURY AND CHANCTONBURY RINGS	19
X. FORTIFICATIONS SURROUNDING DEW-POND NEAR CHANCTONBURY RING	21
XI. REMAINS OF WATCH-HOUSE ENCLOSED WITHIN THE EARTHWORKS DEFENDING THE DEW-POND CLOSE TO CHANCTONBURY RING	22
XII. VIEW OF DEW-POND NEAR CHANCTONBURY RING. TREES COVERING CHANCTONBURY RING SEEN IN THE DISTANCE	23
XIII. VIEW OF PART OF THE MOUND OF CHANCTONBURY RING	25
XIV. VIEW THROUGH LONG AXIS OF MAUMBURY RINGS	29

List of Illustrations

	PAGE
XV. VIEW IN ONE OF THE DITCHES SURROUNDING MAIDEN CASTLE	33
XVI. VIEW FROM SUMMIT OF ONE OF THE SURROUNDING EMBANKMENTS AT MAIDEN CASTLE	34
XVII. VIEW SHOWING SUBSIDENCE AT ONE POINT IN THE RINGS SURROUNDING MAIDEN CASTLE AND THE LEVEL PLATFORMS BEHIND THE RIDGE OF THE EMBANKMENTS	35
XVIII. VIEW OF DEW-POND AND DIVIDING SCARP WITHIN MAIDEN CASTLE	38
XIX. VIEW OF NEOLITHIC ROAD LEADING FROM MAIDEN CASTLE TO POUNDBURY CAMP. (<i>Note that the surface is whitened by daisies.</i>)	44
XX. VIEW OF THE SAME ROADWAY AS SHOWN IN PRE- VIOUS ILLUSTRATION BUT LOOKING IN OPPOSITE DIRECTION	45
XXI. VIEW SHOWING CATTLE-TRACKS NEAR OGBURY CAMP, WITH QUARRY IN THE FOREGROUND	53
XXII. VIEW SHOWING THE DEW-POND CONSTRUCTED ON THE LINE OF THE CATTLE-TRACKS NEAR OGBURY CAMP	57
XXIII. VIEW OF CATTLE-TRACKS NEAR ROAD LEADING FROM AMESBURY TO STONEHENGE CONVERGING ON DEW- POND BY RAILINGS IN FOREGROUND	61
XXIV. VIEW OF CATTLE-TRACKS NEAR TO FIGSBURY RING	65
XXV. DISTANT VIEW OF CATTLE-TRACKS NEAR FIGSBURY RING	69
XXVI. SKETCH PLAN SHOWING NEOLITHIC SETTLEMENT ON ST. MARTINSELL HILL, WILTSHIRE	75
XXVII. SKETCH OF THE DOUBLE RIDGEWAY AT MALVERN	87
XXVIII. PLAN OF THE EARTHWORKS ON DOWNS, NEAR FIRLE, SUSSEX	99
XXIX. SKETCH SHOWING DÉBRIS AT BOTTOM OF CATTLE- TRACKS ON WILLERSEY HILL, WORCESTERSHIRE	107

*“We have no waters to delight
Our broad and brookless vales—
Only the dew-pond on the height
Unfed, that never fails,
Whereby no tattered herbage tells
Which way the season flies—
Only the close-bit thyme that smells
Like Dawn in Paradise.”*

RUDYARD KIPLING,
“The Five Nations” (Sussex).

NEOLITHIC DEW-PONDS AND CATTLE-WAYS

I

CISSBURY RING AND CHANCTONBURY RING

PERHAPS all those who have tried to realise the mode of life of the inhabitants of hill-encampments have found the question of the water-supply their greatest difficulty. General Pitt-Rivers and others have conjectured that there may have been wells within or near the entrenchments; while some, equally at a loss for a solution of the problem, have suggested that these encampments were only resorted to in time of sudden and transient emergency. As to the well theory—setting aside the difficulty of imagining that neolithic man had engineering skill and appliances to enable him to reach the water-level from a height such as Chanctonbury—we may point out that no vestige of a contemporary well has ever been discovered. As to the other suggestion, that of the transitory character of the occupation of these earthworks, a good deal of evidence in opposition to it will be offered when we deal with the Cattle-ways and their connection with

Neolithic Dew-Ponds

the fortified Dew-ponds which are to be found at Chanctonbury and Cissbury.

Striking inland from Worthing, one climbs the Downs to-day by a rough road which leads directly to Cissbury Ring. Soon after leaving the flat land which, at an earlier epoch, was probably a salt marsh, one comes upon a depression in the ground near a disused windmill. This is a dried-up dew-pond which was originally surrounded by an artificial depression in the ground with an embankment beyond. Before, however, entering on the special subject of this paper, it may be well to say a few words on the theory and practical making of dew-ponds in general.

We are not aware that the thermo-dynamics of a dew-pond have ever been elucidated, and it is evident that this cannot be done until the construction of such a pond is understood. There is still in this country at least one wandering gang of men (analogous to the mediæval bands of bell-founders, masons, &c.) who will construct for the modern farmer a pond which, in any suitable situation in a sufficiently dry soil, will always contain water. This water is not derived from springs or rainfall, and is speedily lost if even the smallest rivulet is allowed to flow into the pond. The gang of dew-pond makers commence operations by hollowing out the earth for a space far in excess of the apparent requirements of the proposed pond. They then thickly cover the whole of the hollow with a

and Cattle-Ways

coating of dry straw. The straw in its turn is covered by a layer of well-chosen, finely puddled clay, and the upper surface of the clay is then closely strewn with stones. Care has to be taken that the margin of the straw is effectively protected by clay. The pond will gradually become filled with water, the more rapidly the larger it is, even though no rain may fall. If such a structure is situated on the summit of a down, during the warmth of a summer day the earth will have stored a considerable amount of heat, while the pond, protected from this heat by the non-conductivity of the straw, is at the same time chilled by the process of evaporation from the puddled clay. The consequence is that during the night the moisture of the comparatively warm air is condensed on the surface of the cold clay. As the condensation during the night is in excess of the evaporation during the day, the pond becomes, night by night, gradually filled. Theoretically, we may observe that during the day the air being comparatively charged with moisture, evaporation is necessarily less than the precipitation during the night. In practice it is found that the pond will constantly yield a supply of the purest water.

The dew-pond will cease to attract the dew if the layer of straw should get wet, as it then becomes of the same temperature as the surrounding earth, and ceases to act as a non-conductor of heat. This, practically, always occurs if a spring is allowed to

Neolithic Dew-Ponds

flow into the pond, or if the layer of clay (technically called the "crust") is pierced.

Now to return to this depression in the ground which we called a dried-up dew-pond. Such in fact



1.—DRIED-UP DEW-POND NEAR CISSBURY, FORTIFIED BY A SURROUNDING DITCH AND EARTHEN WALL.

it is; and the question now arises—When was this dew-pond constructed? Standing upon the Downs above it may be seen the gigantic outlines of Cissbury Ring, the work of neolithic man. Dew-ponds such as this are only found within the area surrounding these neolithic settlements, and thus a presumption is raised

and Cattle-Ways

that we may find their origin in the same epoch. That supposition, moreover, is confirmed in connection with the dew-pond of which we are speaking by the fact that it appears to be thoroughly fortified by a sur-



II.—NEOLITHIC ROADWAY LEADING TO SOUTHERN FACE OF
CISSBURY RING.

rounding ditch and earthen wall, precisely similar to, though on a lesser scale than, the great prehistoric earthworks on the top of the Downs.

In these facts we find a solution of the long-standing problem of the water-supply of these elevated settlements.

Neolithic Dew-Ponds

Leaving this pond behind us, and merely noting that it is fortified on account of its distance from the Ring, we ascend the Downs in the direction of Cissbury. Turning to the right through the woods when within a few hundred yards of the great southern entrance of the Ring, we come upon a rolling tract of comparatively low-lying country, to the south of the main structure; and here a grassy roadway will be met with, from which a good view may be had over the valley below.

This roadway is of no modern construction; its smooth surface was doubtless formed on the face of the Downs when neolithic man built his embankments around Cissbury, to which the roadway directly leads.

Looking down from this grassy way into the valley below there may be seen another dried-up dew-pond; and to the north of this may be traced the outlines of great terraces cut in successive steps on the face of the opposite Downs, the artificially level platforms of which vary from 130 to 150 yards in width, and the rises vary from 10 to 20 feet.

There has been considerable doubt as to the purpose of these terraces. It has been suggested that they were formed for purposes of cultivation; or that they may have been used as an outer defence to Cissbury. At any rate they are so situated as to afford an efficient defence if required against an attack by wolves coming up the valley. This defence would be the more needed because the folding of the Downs shuts out any distant view in this direction. Wolves

and Cattle-Ways

might be tempted to approach the settlement by the herds which we shall presently show were kept within the Rings at Cissbury.

Still farther to the east are many traces of a system



III.—ANOTHER VIEW OF THE SAME NEOLITHIC ROADWAY IN THE FOREGROUND. THE TERRACES ON THE OTHER SIDE OF THE VALLEY MAY BE SEEN FROM THIS POSITION.

of defence. In fact, we are not overstating the case if we say that some form of protection may be traced wherever an incursion might be feared. A distinction may be drawn between the forms of defence which are constructed with a ditch and embankments, and

Neolithic Dew-Ponds

those which simply have an embankment and no ditch.

Both these forms of defence may be met with around Cissbury.

It seems to us probable that the embankments which are provided with a ditch were built against an adversary capable of using projectiles, as cover could be obtained by concealment in the ditch. The embankments which are not so provided may very possibly have been simply intended as a defence against an animal attack. These low embankments without a ditch may generally be found for many miles around the sites selected by neolithic man for his settlements.

It seems incredible that these extensive earthworks could have been defended by the inhabitants of the settlements; for this presupposes a vast population, too vast, it appears to us, to have been supported by the available land contained within the defended area around the settlements. Besides, if the level land below the Downs were swampy or covered with forests it becomes a little difficult to see where the opposing enemy could have lived.

To us the explanation of these low earthen embankments appears to be that they were intended as defences against wolves, which we suppose must have been the chief source of danger to the herds and inhabitants of the settlements.

Cissbury Ring itself is an immense structure, surrounding the top of an elevated down, roughly oval,



IV.—VIEW OF INNER AND OUTER EMBANKMENTS AT CISSBURY RING.

Neolithic Dew-Ponds

and having a circumference of about a mile and a half. An inner and an outer circular embankment exist, separated by a deep ditch, the height of the inner ring



V.—DEPRESSION MARKING THE SITE OF A GUARD-HOUSE JUST
OUTSIDE THE SOUTHERN ENTRANCE TO CISSBURY RING.

being frequently as much as 40 feet from the bottom of the ditch.

These Rings are pierced at various points with openings, which will be dealt with separately.

It may be remembered that we diverged from the direct path into the Ring. This path leads to the main

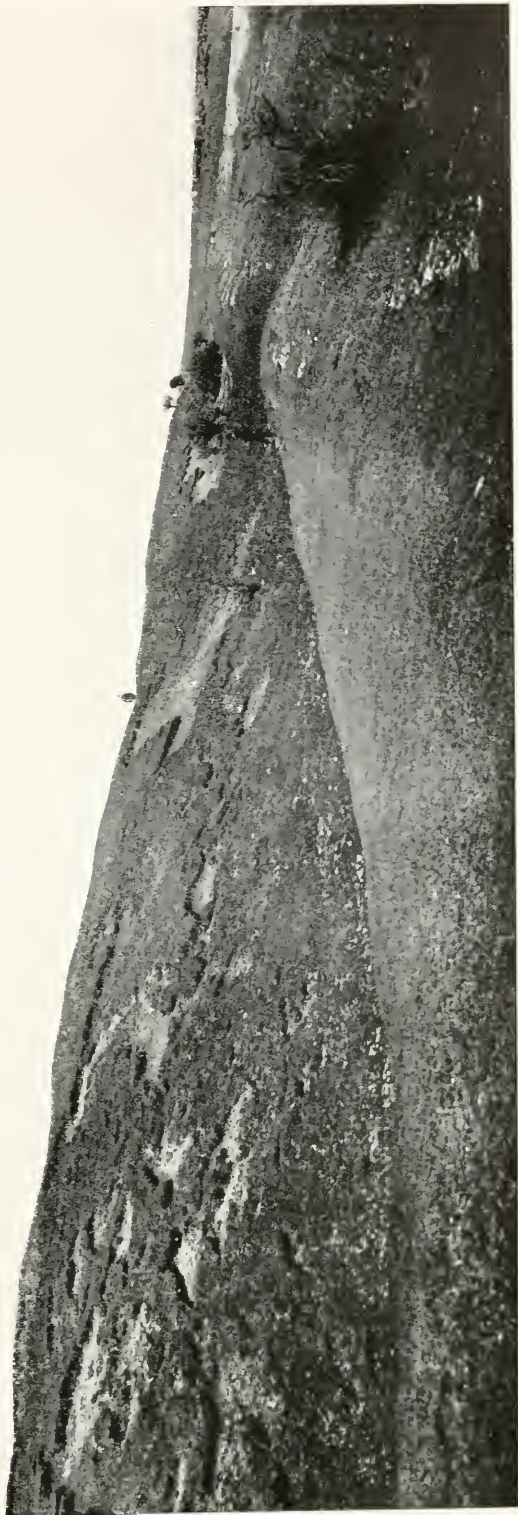
Neolithic Dew-Ponds

entrance, which is situated in the western part of the southern aspect.

The ditch between the rims is here at the southern entrance filled up, and the great inner ring is cleft; but outside the earth which fills the ditch, and close to the end of the ring, is a deep depression which marks the site of a guard-house.

Many such depressions are found within the Ring. They are generally of approximately the same area and depth—3 or 4 feet deep, and 10 to 12 feet in diameter. These depressions are all that remain of the dwellings of prehistoric man. The larger and deeper depressions may be the shafts leading to underground flint quarries which were excavated by General Pitt-Rivers. Turning to the east, within the camp, we presently arrive at one of these smaller depressions close to an entrance, which is above the platforms. At this entrance it may be seen that the outer embankment is cleft and the inner one only partially so. This depression is suitably chosen for the dwelling of the man whose duty it may have been to keep a look-out over the falling land on which the terraces have been constructed—a sort of watchman's house.

Proceeding on our course, we come to the eastern entrance. Here we find the traces of guard-houses outside, remarkable in that they have rectangular ground plans. These occupy the space which would otherwise have been taken up by the ends of the outer Ring.



VI.—CLEFT IN THE OUTER RING AT CISSBURY AT A POINT OVERLOOKING THE TERRACES.

Neolithic Dew-Ponds

It is curious to note that here, unlike the great southern entrance, which has merely an outside guard-house, this entrance has not only guard-houses, but that immediately within are the remains of a dwelling.



VII.—EASTERN ENTRANCE TO CISSBURY RING SHOWING TRACES OF
RECTANGULAR GUARD-HOUSES.

The position of this dwelling, situated as it is at the point where the cattle, as we shall proceed to show, entered and left the Ring, seems to suggest that the cattle were counted. Perhaps it may have been a cattle tally-house.

Leading from the outside of this eastern entrance,

Neolithic Dew-Ponds

two almost parallel artificial gullies or cattle-ways are deeply scored upon the side of the down. They wind round the north-east shoulder of the down, and arrive on level ground at a point directly to the north of



VIII.—CATTLE-WAYS LEADING DOWN TO DEW-POND AT THE NORTH OF CISSBURY RING.

the Ring. At their terminations on the level ground lies a dew-pond, still full of water.

Apparently the herds were driven down the lower road, which leads most directly to the dew-pond, and, after being watered, were driven back again by the upper of the two roads, the confusion which would have

and Cattle-Ways

been caused by the passing of animals going in opposite directions upon the same road being thus avoided.

We point out that the existence of these two cattle-ways leading directly to a dew-pond is further evidence in support of our contention that some of these ponds are contemporary with the hill-settlements. Immediately adjacent to this dew-pond, which is without defensive earthworks, lie the traces of a prehistoric habitation. The importance of this dew-pond to the settlement is obvious from the fact that it was thus guarded, and that, in the event of any alarm, assistance could be summoned from the settlement above. It will be observed that we have now adduced a threefold evidence in favour of the view that some of the dew-ponds are contemporary with the neolithic earthworks :—

- (a) Certain dew-ponds are fortified in a manner similar to the neolithic earthworks of the settlements.
- (b) Some of the neolithic earthworks around the settlements are constructed in such a manner as to provide communication, to and fro, between them and certain dew-ponds.
- (c) That a dwelling similar to the dwellings within the Ring is not unfrequently found in close proximity to a dew-pond.

In our opinion this evidence is conclusive as to the neolithic construction of some of the dew-ponds.

Continuing the circuit of the wall, we find numerous traces of habitations in a contracted area in the north-

Neolithic Dew-Ponds

western part of the region enclosed by the Ring. These habitations were probably occupied by the herdsmen and their women and children.

From this portion of the settlement there is a narrow footpath, in places deeply worn into the ground, also leading directly to the dew-pond. We know of only one instance of a dew-pond being found within any of these ringed settlements; and we suggest that the explanation is to be found in the fact that, on the inside of the Ring, the animals were so closely packed that their trampling feet would have rendered any pond useless.

Lying to the north of Cissbury Ring, at a distance of about four miles, is Chanctonbury Ring. This is assailable only on its southern side, and is a landmark in every direction, the views from its summit being amongst the widest in England.

When walking from one Ring to the other we discovered a low embankment, and as this did not present any of the characteristics of modern work, we determined to trace its course. We found that it enclosed an area roughly circular, with a circumference of about three or four miles.

We were able with absolute certainty to trace the embankment throughout its entire length, with the exception of some few hundreds of yards on the rising ground in the west. On this sloping ground the rains of thousands of years had washed it away.

and Cattle-Ways

The area contained within this embankment was probably devoted to the production of hay or used as a grazing ground, and had been protected not only by the mound but by guard-houses, of which we found the traces at intervals in the northern section of the structure.



IX.—THE LOW EMBANKMENT ENCLOSING AN AREA OF LAND BETWEEN
CISSBURY AND CHANCTONBURY RINGS.

Leaving this enclosure behind us, and continuing in the direction of Chanctonbury Ring, we observed yet further earthworks.

These consisted in the first place of a low embankment running directly towards Chanctonbury Ring;

Neolithic Dew-Ponds

this embankment continued until a steep declivity on our right had disappeared and we reached comparatively flat and open country.

The low embankment at the side of the steep declivity here appeared to define the limit of the contained area around the settlement. The declivity itself would be useless either for grazing ground or cultivation; but it here formed a natural defensive boundary to the settlement.

From this point, where the low embankment surmounts the natural declivity of the land, a long and gentle slope, gradually becoming steeper, brings us to the bluff lying to the south-east of Chanctonbury Ring, from which it is less than a quarter of a mile distant. On this bluff may be found perhaps the most interesting of all the objects we are describing.

As one ascends the bluff the skyline reveals the fact that it is crowned by fortifications on a fairly large scale. It is not, however, until one is actually upon it that one perceives the purpose of these earthworks. They are then seen, on the aspect facing the steep side of the bluff, to surround a dew-pond. They consist of a deep trench cut in the face of the hill, part of the thrown-up earth from which forms one side of the basin, while the remainder forms two parallel protective mounds.

This trench and the mounds are carried round the exposed side of the pond, farthest away from the Ring, and extend in each direction for some distance

and Cattle-Ways

in such a manner as to furnish cover along the steepest part of the ascent. The space between the dew-pond and Chanctonbury Ring is entirely open and unprotected. Not only do these earthworks closely



X.—FORTIFICATIONS SURROUNDING DEW-POND NEAR
CHANCTONBURY RING.

surround one side of the pond, but, as they extend to the east, they enclose the remains of a dwelling or watch-house.

The very steep side of the down on this, the north-east aspect, was probably covered by primeval forest, the natural resort of wild animals.

Neolithic Dew-Ponds

It is evident that this dew-pond together with another smaller one, which is situated on the top of the ridge to the west, furnished the water-supply of the inhabitants of Chanctonbury Ring. In the event of their destruction, the inhabitants of the Ring would



XI.—REMAINS OF WATCH-HOUSE ENCLOSED WITHIN THE EARTHWORKS DEFENDING THE DEW-POND CLOSE TO CHANCTONBURY RING.

have been temporarily reduced to the utmost straits, and in this fact one may find an explanation of the amount of labour expended not only on their construction, but on the protection of the larger one. This larger dew-pond, of sixty or seventy feet in

and Cattle-Ways

diameter, necessarily an elaborate structure, built, as we have pointed out, before the age of any metal implement, was a work of incredible labour, comparable in amount to that expended in building the Rings themselves. It is worthy of note that, although



XII.—VIEW OF DEW-POND NEAR CHANCTONBURY RING. TREES COVERING CHANCTONBURY RING SEEN IN THE DISTANCE.

it cannot be perceived from below, it is well in view from Chanctonbury Ring itself. But a short distance lies between the pond and the Ring; and as one traverses this intermediate space, a fresh element of interest may be discerned by the experienced eye.

Neolithic Dew-Ponds

As the ground steeply rises to the Ring, the remains of about half-a-dozen circular mounds may be traced, lying immediately outside the Ring on the eastern slope. These tumuli are of present human interest in that they have been placed in that spot upon which the rays of the rising sun will first strike. There the sleepers await the Dawn of the New Day.

The Ring surrounds the apex of one of the highest downs in the South of England. It is the most conspicuous position in a whole system of settlements on the South Downs. It projects like a promontory from the South Downs into the Sussex plain below, and the apex of this headland stands over 800 feet above the level of the sea.

At present it is covered by a large clump of trees, and the mound is raised just within their margin.

The view from this point is one of the most magnificent and extensive in England. On a clear day one may perceive in the south-west the outlines of the Isle of Wight, and in the south-east the position of Brighton may be discerned. Northwards the great plain of Sussex is laid out as on a map. From this plain the down rises almost precipitously to the summit. The mound of the Ring itself is perhaps 12 feet high, and makes a complete circuit as a crown upon the head of the down.

The trees within this Ring have served a double purpose—the fallen leaves have formed a mould which hides the remains of any habitation or other sign of

and Cattle-Ways

primeval occupation ; but their roots have gradually brought to the surface remains of a later occupation. We found Roman roof tiles in such profusion that it would have been an easy matter to fill a barrow with them.



XIII.—VIEW OF PART OF THE MOUND OF CHANCTONBURY RING.

The Roman, like his primeval predecessor, had been attracted to this wonderful spot ; and the remains of the moulded roof tiles suggest the former existence of a comparatively permanent structure, but we could find no definite evidence of its purpose or character.

This unique spot, which was of such vital importance

Neolithic Dew-Ponds

to the existence of primeval man, and where he laid his dead to be greeted by the rising sun, may have been but a pleasure resort to the luxurious Roman, and to-day it is scarcely more than a name to the inhabitants of the district.

Neolithic man approached his settlement by passing over the whole range of the Downs, and from his exalted position he could look down upon Cissbury Ring some miles distant, where his herdsman were guarding his beasts.

Descending the comparatively precipitous northern slope is a neolithic road which is no mere gully or cattle-way. This is a broad, smooth route, cut in the side of the down, designed to take advantage of the easiest gradients leading from the Ring.

Standing upon the upper parts of this roadway and looking out upon the broad plain below, one sees the white straight line of a Roman road drawn through the country as though with a ruler. This line terminates at a distance of some miles from the foot of the Downs; but, if it is projected, it will be found to meet the spot at which the road from the summit enters the plain.

The antiquity of the road upon the down is attested by a tree growing on the cutting formed to construct it. This tree must have taken root since the road was constructed, otherwise it would not be found on the surface of a cutting exposed during the period of construction. Its trunk, though short, is of great girth,

and Cattle-Ways

hollow and gnarled, covered by great bosses and excrescences, and with ferns growing in the angles of the boughs ; its age must be measured by centuries.

At the present time the end of this road is lost in a chalk-pit at the bottom, but from the fields below its course may be clearly discerned.

II

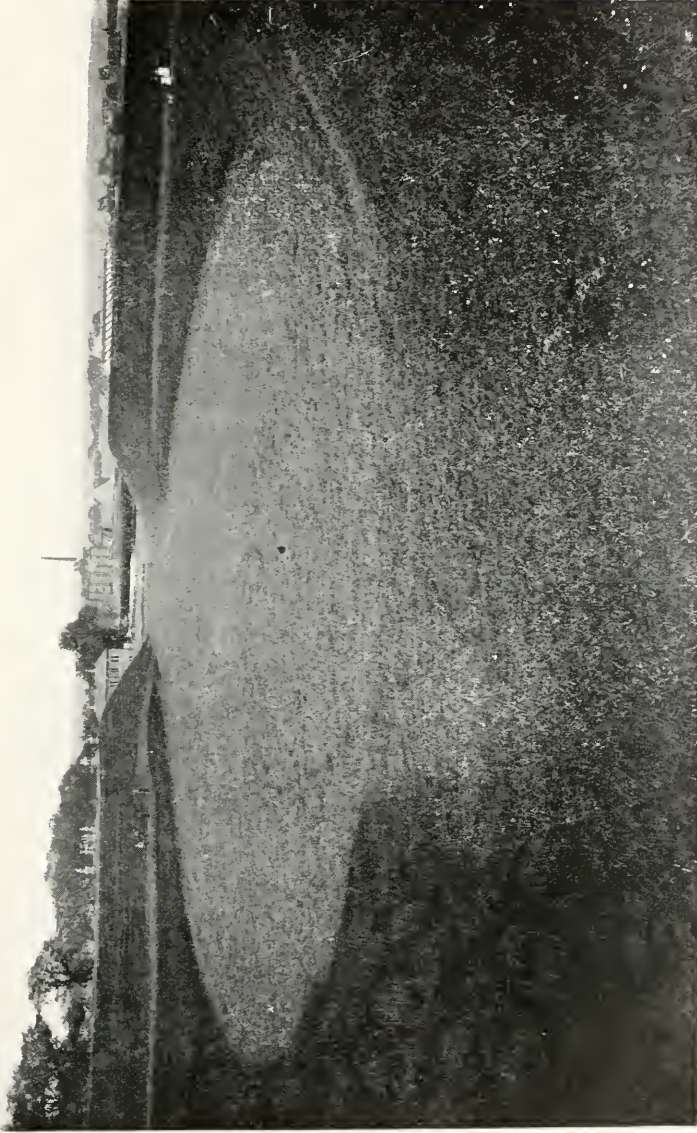
MAUMBURY RINGS AND MAIDEN CASTLE

MAUMBURY RINGS

THIS earthwork, situated near the railway stations on the outskirts of Dorchester, appears to us to differ entirely in purpose from the ordinary neolithic hill settlements with which it is certainly contemporary ; and in spite of the fact that it has no connection with the dew-ponds which form the main subject-matter of this pamphlet, we venture to draw attention to some of its peculiarities.

It is universally, and, in our opinion, incorrectly, referred to as a Roman amphitheatre. The structure possesses, not the characteristics of Roman work, but those which distinguish the labour of neolithic man, the mounds which we are about to describe being constructed in the same manner, and of the same materials, as the embankments of the neolithic hill settlements.

The construction of simple earthworks is anterior to the use of the shaped stones which were erected on Salisbury Plain, and we may safely assume that at the period when Stonehenge was set up the worship of the sun in this country was already of considerable antiquity.



XIV.—VIEW THROUGH LONG AXIS OF MAUMBURY RINGS.

Neolithic Dew-Ponds

There is, therefore, a probability that the first Solar Temples of prehistoric man were built in a manner similar to the hill settlements.

At Maumbury Rings we find an oval structure, the interior measurements of which are 218 feet by 163 feet. It is an earthen embankment approximately 30 feet high. At the north-east this embankment is cleft, and an opening some 30 feet wide at the bottom occurs at this point, which is at one end of the long axis of the oval. At the other end of this axis the upper portion of the embankment was not constructed.

The orientation of the structure was carefully determined by us, and found to coincide accurately with that of Stonehenge.

The opening in the embankment allows the vivifying rays of the rising sun to enter, and, passing along the long axis of the structure, to strike upon the rising floor at the opposite end. The impression left on our minds was that in the earthwork before us we probably had one of the earliest temples erected for the worship of the sun.

During our examination we remarked upon the omission of any stone analogous to the Sun Stone, or Helstone, over which the midsummer sun rises at Stonehenge. We subsequently found in "The History and Antiquities of the County of Dorset," by John Hutchins, M.A., 1868, vol. ii. p. 795, that—

"Roger Gale derived the name Maumbury from Maen, a great stone which lay at the entrance when he saw it in 1719."—(MS. letter.)

Neolithic Dew-Ponds

By another authority we have found it stated that a large stone formerly existed at the entrance; but as this was found to be an obstacle to the cultivation of the land, a hole was dug and the stone was deposited in it. A subsequent search has failed to discover it.

Seeing that both these authorities make reference to the stone at the entrance without any suspicion as to its solar significance, we feel no doubt as to its previous existence.

MAIDEN CASTLE

Almost due south-west, at a distance of about two miles from Dorchester, stands Maiden Castle.

Its outlines may be seen from the Roman road leading from Dorchester to Weymouth, but they give little indication of the awe-inspiring immensity of the works. It lies at an elevation of 430 feet above the sea, surrounding the summit of one of the largest downs in the neighbourhood.

The area within the Rings is from 40 to 50 acres in extent, and the circumference is about one mile.

To this day it would be a matter of very considerable difficulty to reach the contained plateau except by one of the regular entrances. It is most conveniently approached by the eastern entrance.

The complexity of the maze of stupendous earth-works by which the entrance is guarded baffles description. It suffices to say that an approaching enemy, furnished only with such weapons as were known to

and Cattle-Ways

primeval man, must have found the place impregnable. To this day it produces a sensation of bewilderment, for every inch of its lengthy and tortuous course is dominated by a succession of spurs and embankments



XV.—VIEW IN ONE OF THE DITCHES SURROUNDING MAIDEN CASTLE.

on either side, so arranged that tier above tier of the defending forces would be continuously encountered.

An attempt to attack the settlement from any other point than the entrance is not less obviously doomed to failure.

Neolithic Dew-Ponds

An approaching enemy would have to scale great embankments, even now 50 to 60 feet in height, with steeply sloping sides, placed one behind another to the number of three or more. Each ridge would doubtless



XVI.—VIEW FROM SUMMIT OF ONE OF THE SURROUNDING
EMBANKMENTS AT MAIDEN CASTLE.

be defended by men to whom, owing to the nature of their position, defeat or retreat involved certain death.

As may be seen in the illustration (XVII.), wherein the subsidence at one point in the Rings round Maiden Castle is depicted, some of the embankments have



XVII.—VIEW SHOWING SUBSIDENCE AT ONE POINT IN THE RINGS SURROUNDING MAIDEN CASTLE
AND THE LEVEL PLATFORMS BEHIND THE EMBANKMENTS.

Neolithic Dew-Ponds

level platforms behind them, beyond which again is the deep trench in front of the next embankment. On this level platform the reserves were probably waiting to take their place in the fighting line, when those upon the crest had fallen.

The central plateau is kidney-shaped, and is divided into two roughly equal parts by a transverse scarp of artificial construction. The eastern division, which has two complicated double approaches in close proximity to each other, is the first to be reached from the Roman road, and stands at a higher level than the western. It was probably occupied exclusively by the human inhabitants; the western, into which the cattleways enter, being devoted to the herds. We shall, however, presently bring forward evidence that only such a portion of the herds was kept at Maiden Castle as would suffice for the needs of the community during the winter.

A dew-pond is here found within the Rings. This is unusual, but a reason for this is to be found in the fact that outside the Rings a supply of running water was at hand, in this respect presenting a contrast to Chanctonbury-cum-Cissbury. The traces of many dew-ponds may be found outside the Ring in positions removed from running water.

There is no evidence of the means by which this pond was preserved from the trampling of the herds, and being within the Rings it is, naturally, unfortified. It is near the dividing central scarp, and is thus con-

Neolithic Dew-Ponds

veniently placed to supply the needs both of the human community and of the animals.

Leading down from the eastern, and we presume the cattle quarters, we find, as at Cissbury, two cattle-ways. The one by which the animals descended takes



XVIII.—VIEW OF DEW-POND AND DIVIDING SCARP WITHIN MAIDEN CASTLE.

a northerly course and leads directly to the undulating land suitable for grazing grounds. The ascending cattle-way takes an opposite direction, and is marked by the remains of a Tally-house at the bottom. The length of the ascending cattle-way is a quarter

and Cattle-Ways

of a mile or more, and winds in and out between the great embankments in such a manner as always to maintain an easy gradient. Here, as at Cissbury, may be seen what we have presumed to call a Tally-house at the point of entrance of the cattle-way into the settlement.

The route of these cattle-ways through the embankments is not less complicated or less capable of defence than the eastern entrance to which reference has already been made. The ascending cattle-way, obviously a position of danger at the time when the herds are being driven home, winds between no less than seven formidable embankments.

On the southern side of the eastern section, a deep hole may be seen in the ground within the Castle; and beneath a stone lintel in the outermost Ring there appears to be the entrance to a subterranean passage. As the hole and the passage are nearly opposite each other, it would appear that they were connected. Local tradition has it that beneath this stone lintel was found a stairway, and that after so much had been discovered, the staircase was filled up with earth. It is, at any rate, now so nearly blocked that it is impossible to enter. The evidence of apparent subsidence in all the Rings has been along an imaginary line between the above-mentioned large hole in the central plateau, and the entrance to the passage which is found beneath the lintel of limestone. This is distinctly corroborative of the former existence of a subterranean passage

Neolithic Dew-Ponds

leading from the central plateau into the outermost trench. The possible purposes of such a passage are several. This section of the embankments, being the least protected by works external to the Rings, is the only one which was likely to suffer a surprise, and which could not be quickly manned by the defender. A passage such as is here indicated would enable this to be done with expedition.

If the reader will divest his mind of modern needs, and realise only the primal necessities of prehistoric man, it will be evident that they may be summed up very simply. The preservation of the community, through which alone he could live, was his only care.

The dangers to the community would be famine, or destruction by human or animal enemies. To guard against famine it would be necessary to maintain and protect great herds of animals. To maintain the animals it would be necessary to secure, and to be able to defend, great grazing grounds for the summer; and it would be also necessary to provide fodder for the winter months.

The conditions we have described conform to the antecedent necessities of his bodily welfare, and we believe that this conformity may be traced very much further than has been hitherto attempted. We now proceed to suggest what were the arrangements made by neolithic man for miles around his settlement.

Our examination was conducted in May 1904, when a rich profusion of wild flowers was beautiful

and Cattle-Ways

in the sunshine. The irregular distribution of the crop of daisies had early attracted our attention. We observed that, for some inexplicable reason, they carpeted the prehistoric roadways which are carved for miles on the face of the Downs. At the foot of the descending cattle-way we were both struck by the sight of a well-marked almost complete circle of daisies, as absolutely true as though it had been described by a pair of compasses. The only omitted part was a segment in the north-east. The circle was not only apparent on the spot, but its outline was clearly indicated when looking down from the ramparts at a point more than a quarter of a mile away. The diameter of the ring of daisies, which we independently paced in different directions, was 46 yards, and the band of daisies itself, though it varied considerably in width, was about two yards wide. The inner edge of the band was, however, always well defined, except, as we have said, in the north-east. There, for twenty yards or so, the circle was broken.

Slight indications of earthworks were found in the immediate neighbourhood of the circle; and we may conjecture that the ring of daisies, plants which usually flourish best on hard ground, still traces for us the outline of a former work.

An embankment runs straight in a northerly direction from the north-east corner of the Castle, and to this day marks a parish boundary. To the north and east beyond its termination we traced for several miles

Neolithic Dew-Ponds

a succession of embankments which in all cases had a definitely ascertainable purpose. We found that these earthworks sometimes took the form of a platform with a steep declivity, sometimes that of trench and embankment, and that they sometimes were merely a cutting in the ground. Their position indicates that they offered a means of defending the herds from the attacks of animals. They are invariably in a position to protect the heights from the denizens of the marshy or wooded regions below; and wherever, owing to the configuration of the ground, there is the appearance of danger, the necessary earthworks will be found to protect the heights from an attack from below. There is no limit, that we could discover, to the area that has been thus treated. When the eye has once become accustomed to the system of defence adopted by primeval man to protect his herds, one can predict from a distance with much certainty what will be found on a closer inspection of the land. Between Maiden Castle and Poundbury Camp a network of such defences is continuous. If one follows the low-lying land between the two, one may see these earthworks on the rising ground on either hand. With this object in view, it becomes extremely interesting to follow the course of any of the streams in the neighbourhood.

The chief occupation of neolithic man was to protect the herds on which his life depended. A further evidence of this necessity may be seen in the carefully constructed roadways he made for them. Just beyond

and Cattle-Ways

the termination of the embanked parish boundary, above the invariable defences along the margin of the lower ground, may be found the beginning of a road at a point midway between Maiden Castle and Poundbury Camp, and on the eastern side of the valley. If we now follow this roadway, which begins on the east side of Fordington Down, we find that it ultimately leads to Poundbury Camp.

At more than one point we find diagonal cattle-ways leading down to and up from the low-lying valley. These cattle-ways at some former period led down to the water at the bottom of the valley. Nearing Poundbury Camp the road is cut in the steep bank of the river Frome, and a well-marked example may be seen here. Diagonally down this bank, in the least precipitous part, cattle-ways meet at an angle at the bottom. Obviously, one was the descending cattle-way, and the other the ascending. At the point where they meet at the bottom the whole surface of the ground has been disturbed by mounds and excavations. The river has now receded from these works, and is at a lower level—a fact which indicates the antiquity of the structures in question; and at these points it would be an easy matter to determine the difference of water level since the cuttings were made.

Continuing our walk along this road from which the diagonal cattle-ways descend, and observing in passing the profusion of daisies which whiten its surface, we see in the distance the great mounds of Poundbury Camp.

Neolithic Dew-Ponds

The river was the natural defence and boundary of the settlement on the north, and Poundbury Camp was an outlying defence and place of assembly for the bulk of the herds.



XIX.—VIEW OF NEOLITHIC ROAD LEADING FROM MAIDEN CASTLE
TO POUNDBURY CAMP.

(Note that the surface is whitened by daisies.)

This roadway does not lead into Poundbury Camp at its nearest point, but is continued between the embankments and the top of the river bank. At a point on the east face of the Camp the embankments cease, and here the cattle entered the enclosure.

It is interesting to notice that at this, possibly the

and Cattle-Ways

chief location of the herds, there are, on the three exposed faces of the Camp, just outside the embankment, and continuous with its base, extensive platforms with a declivity beyond.



XX.—VIEW OF THE SAME ROADWAY BUT LOOKING IN THE
OPPOSITE DIRECTION.

Poundbury Camp is, roughly, rectangular, and one peculiarity of this settlement is to be found in the tendency to the adoption of the rectangular form in place of the circle. Thus we find that the best-preserved tumulus in the neighbourhood, known as Clandon Barrow, is in fact a pyramid. The only

Neolithic Dew-Ponds

difference from its Egyptian parallel is in point of size and material. Its faces are duly oriented to the four points of the compass.

Neolithic man, having made most elaborate defences against sustained attack, was also very careful to guard against unexpected approach. From the situation of his settlements he was able to command extensive views over the surrounding country; but, if any down in close proximity to his settlement hid any portion of the country from his immediate observation, he took the precaution to put an outlook station on such obstructing down. At the Maiden Castle there is such a down, known as Hog Hill; and on the summit there is an artificially raised station from which a guard could conveniently signal to the occupiers of the settlement, and give warning of the approach of an enemy. This outlook station is not only close to Maiden Castle, but the great embankments of Poundbury, which are themselves hidden from Maiden Castle, may be seen from it in the distance, and it thus furnished a link between the two.

Every conceivable precaution for the welfare and protection of the community appears to have been most carefully considered and executed.

With a sympathetic understanding of primeval man's needs, it is still easy to find the remains of his works. It is, however, a matter of extreme regret to find that, under the ravages of the burrowing rabbits, the great embankments are gradually crumbling away.

and Cattle-Ways

The farmer's plough is also as surely working destruction to these monuments of neolithic man. Year by year the plough shears off a foot or more from the base of the great tumuli, and it is sad to see these sepulchres being gradually levelled. The dew-ponds, too, are becoming filled up, and the plough in more than one case has been driven through these ancient water supplies. Soon they will be levelled out of recognition, and if these ravages are allowed to continue without hindrance it will be impossible even to trace their remains.

Not only are the great embankments being gradually allowed to crumble away by the inroads of thousands of rabbits, and the dew-ponds and tumuli levelled by the plough, but the chain of evidence is now, for many many acres at a stretch, already entirely obliterated. The defences and trenches are as entirely erased by the plough as though they had never existed.

To the unsympathetic eye these banks and trenches have no particular meaning, and are only regarded by the farmer as obstructions which are to be got rid of as soon as possible, to enable him to bring the land under cultivation.

In this utilitarian age it is perhaps useless for us to raise a protest ; but we cannot resist doing so when we see the ploughshare cutting out these relics of man's earliest works in our country. For thousands of years they have existed ; and yet in the course of a few generations only the distorted remains of the gigantic

Neolithic Dew-Ponds

embankments will be visible, and it will be impossible to trace, as we have attempted at Maiden Castle and Poundbury Camp, the connection between them.

Maumbury Rings until but a few years ago had its comparatively small floor ploughed up, in order that a handful of corn might be raised upon the ground.

We have already pointed out that the great stone which formerly stood at the entrance of the Ring, and the shape and site of which would be of so much interest, has been removed and buried.

Perhaps there may have been centuries of labour expended in the construction of the great embankments around Maiden Castle. It is now impossible to gauge what height they may have reached; but those great chalk embankments, glaring in their whiteness where they crowned the Downs, must have been formidable fortresses against all possible foes.

“The month which we now call January our Saxon ancestors called wolf-monat, to wit, wolf-moneth, because people are wont always in that month to be in more danger to be devoured of wolves, than in any season else of the year; for that, through the extremity of cold and snow, those ravenous creatures could not find of other beasts sufficient to feed upon.”

RICHARD VERSTEGAN,

“Restitution of Decayed Intelligence in
Antiquities, 1673.”

III

CATTLE-TRACKS *

ONE of the hereditary instincts of gregarious animals is to follow in the footsteps of their recognised leader ; and this habit among cattle, if acted on uninterruptedly for a sufficient period, will cause certain well-marked routes to be formed on the land.

The tendency of rabbits to congregate together is well known, and those who have examined the hill settlements of early man must have observed the rabbit runs on the sides of the embankments. Sometimes the sides are too steep for the rabbits to form a head-long course straight up and down, and they then strike a perfectly horizontal one. These parallel runs in time become trodden around the steep sides, and are formed with such perfect regularity that a child could safely walk up the sides of the steepest embankment as though mounting a broad and even staircase.

On hillsides where sheep have been allowed to roam for very long periods, we may observe that regular beaten courses have been formed by their feet. In the vast plain of Central Canada the tracks

* We use the word "cattle-track" to indicate the routes formed merely by the treading of herds, in contradistinction to the word "cattle-ways," which we have adopted for roads formed by man for the use of his cattle.

Neolithic Dew-Ponds

of the now extinct herds of buffalo may be seen stretching from horizon to horizon: these may be traced from one watering place to another on the route of their annual migrations.

This hereditary instinct of herding animals to follow exactly in the footsteps of their leaders is well recognised; and, on Salisbury Plain and its neighbourhood, the cattle-tracks thus formed some thousands of years ago may be seen to this day deeply scored in the land.

The cattle-tracks to which we shall presently refer appeal to us perhaps with especial force, as showing how century after century the husbandry of the race occupying the encampments was continued without change or interruption.

On the river Avon is the small village of Durnford, about six miles north of Salisbury, and on the crown of the hill on the east side of Durnford is a hill settlement known as Ogbury Camp. A comparatively new road has been constructed about a quarter of a mile to the south-west of the Camp; and on the east side of this road it will be seen that the land has been deeply scored by trenches from two to three feet deep, and that one trench is perhaps as much as ten feet deep.

There is obviously no preconceived design in the laying out of these tracks. They commence just below the brow of the hill, and may be traced from thence descending toward the river Avon in the valley



XXI.—VIEW SHOWING CATTLE-TRACKS NEAR OGBURY CAMP, WITH QUARRY IN THE FOREGROUND.

Neolithic Dew-Ponds

below. The brow of the hill, which is here defined by a cutting for a lane, is under cultivation, and the tracks in consequence cannot be traced, nor can they be traced in the valley below, for the land is here again under cultivation; but in the intermediate space between the brow and the valley the tracks are well defined.

At some points in their course perhaps two or more lead into each other and are then continued as one. The lines of these trenches are in fact just such as might be taken by herds of cattle following their leader from the high lands to the river below. They are cattle-tracks.

A good section of the land has been exposed, where a quarry has been formed cutting through the lines of the cattle-tracks. From this section it may be seen that the cattle-tracks form trench-like depressions in the land, cutting through the natural stratification.

In support of the theory that these trenches are worn down from the surface of the land, it is an important point to observe that the embankments which rise between them are not formed of made-up earth. If man had dug out these trenches he would probably have thrown up the excavated earth, thus forming mounds between the trenches; but that this is clearly not the case may be seen in the exposed section of the land where the quarry has been made.

The subsoil is chalk, and the depth of these cattle-

Neolithic Dew-Ponds

tracks indicates that the cattle had been habitually, and probably for centuries, trampling the same roads. Situated as they are close to Ogbury Camp, it seems apparent to us that this particular hill settlement must have been in constant occupation, and that it was not simply, as is often assumed to have been the case with hill settlements in general, a place of refuge in time of danger.

We have shown at Cissbury that man had constructed roadways for his cattle leading up to, and down from, the settlement to the dew-pond below; and we have also shown by this example, and by the entrenchments around the dew-pond at Chanctonbury, which are contemporary with the rest of the earthworks, that the art of the construction of dew-ponds was known to neolithic man. Here on the cattle-tracks close to Ogbury Camp we will show further evidence to the same effect.

Undoubtedly it was in the wooded and marshy lands of the valleys that the cattle of neolithic man were most exposed to danger, for it would be here that the wolves would be likely to roam and probably to collect near the habitual watering places of the cattle. In winter time, if food were scarce, the cattle would be especially exposed to danger; and early man, armed only with his implements of flint, would probably have found difficulty in protecting his herds.

So, as it appears to us, he conceived the idea at Ogbury that it would be wise to construct a dew-pond



XXII.—VIEW SHOWING THE DEW-POND CONSTRUCTED ON THE LINE OF THE CATTLE-TRACKS NEAR OGHURY CAMP.

Neolithic Dew-Ponds

on the high land in order to supply his herds with water, and thus to avoid exposing them to the attendant risks of the river below.

It was in fact no easy problem which presented itself to him. On the one hand, if his cattle continued to go down to the river to get water, there was the risk of the wolves; and yet, on the other hand, how could he induce his herds to leave their well-trodden roads and drink from the dew-pond he proposed to construct?

These early herdsmen were probably keenly alive to the natural instincts of their cattle, and the hereditary instincts of the herds to follow their leader would probably have been more pronounced in those days than it is now, after the lapse of at least four thousand years of breeding under man's fostering care. The men must have been aware that it would be no easy matter to induce the leaders of the cattle to depart from their well-trodden roads in order to drink the insipid water on the shadeless banks of a dew-pond when there was the cool and refreshing river flowing in the shade of the trees in the valley below.

The dew-pond neolithic man here constructed for his herds fairly and squarely met the difficulty. Right in the middle of the cattle-tracks he dug it. It apparently is so designed as to intercept all the cattle-ways except one, the obvious intention being to leave the cattle no alternative but to get their water at the dew-pond, or to pass by along the one way which we think was purposely left intact.

Neolithic Dew-Ponds

This one cattle-track which runs just outside the dew-pond is trodden down to a far greater depth than any of the others. We think that this particular way was purposely left for the cattle, so that it might be traversed by them while the dew-pond was being constructed.

It was probably anticipated that the peace of mind of the cattle would not be unduly disturbed if at all events one of their traditional routes to the river were left untouched.

All this is rather hypothetical; but if we have read aright the difficulty which presented itself to early man and the means he took to get over it, we cannot help admiring his ingenuity, and we now regret having to record that apparently this effort on his part to preserve his herds was a failure.

It was rash of him to attempt to construct a dew-pond on a peculiarly unsuitable piece of land. Alongside of these trenches is the even and unbroken gentle slope of the hill; here he could have built his dew-pond with far less labour and with far greater probability of success.

The dew-pond in the midst of the cattle-tracks we fear never held water. The old tracks run sharply down to it, and the same old tracks reappear again beyond it.

There is nothing to indicate that the dew-pond had been constantly used for watering the herds, and much which tends to show the reverse. Perhaps it is pos-



XXIII.—VIEW OF CATTLE-TRACKS NEAR ROAD LEADING FROM AMESBURY TO STONEHENGE
CONVERGING ON DEW-POND BY RAILINGS IN FOREGROUND.

Neolithic Dew-Ponds

sible that there may have been some slight trickle of water down the trenches during heavy rain which would have moistened the layer of reeds or straw below the clay, in which case, as we have before shown, the thermo-dynamics of the dew-pond would have been upset. But there is yet further evidence of the failure of the dew-pond as a means of supplying the herds with water. The depth of the cattle-tracks, intercepted by the construction of the dew-pond, does not perhaps exceed three feet, whereas the depth of the solitary cattle-track which runs just outside the boundary of the dew-pond is about ten feet. From this fact it seems clear to us that this particular cattle-track had to be used by the cattle on their way to the river, not only while the dew-pond was being constructed, but for very many years afterwards. The other cattle-tracks had been rendered impassable by the impeding dew-pond. It was not the dry crust at the bottom of the dew-pond which was impassable; but it was the bank at the side of the dew-pond towards the valley which must have been too steep for the cattle to descend. So the cattle continued to trample still deeper the one way which had been left to them.

Ogbury Camp is somewhat off the beaten track, and is little visited, as it is not considered as having any particular interest; but we know of no better example of cattle-tracks than those which may be found adjacent to this settlement.

Neolithic Dew-Ponds

Traces of cattle-tracks may be observed along the road which leads from Amesbury towards Stonehenge. Just by the fork of the road where one branch leads to Winterbournestoke and the other to Maddington, the road stands at a higher level than the land on either side of it. At an earlier epoch this low-lying land was under water, and clear evidence of this fact may be seen in the cattle-tracks which descend from the higher ground to the valley below. The ground here on either side of the road has been trodden into comparatively deep tracks in a precisely similar manner to those we have observed at Ogbury Camp.

At a later epoch it would appear that the water in the valley subsided, and that neolithic man constructed a dew-pond so as to continue to supply his herds with water at the same spot. We here again, as at Ogbury, observe the care man took to try and procure water for the cattle in such a position that it was not necessary for them to leave their traditional tracks. The only difference between the two is that the dew-pond at Ogbury was built at the top of the hill, and the one we are now considering near Stonehenge was built in the valley. Presumably at this spot, so close to the sacred grounds of Stonehenge, there was not the same danger to the herds as existed in the valley of the Avon near Ogbury Camp.

If one looks in a southerly direction along this valley one may see, at a point less than a quarter of a mile



XXIV.—VIEW OF CATTLE-TRACKS NEAR TO FIGSBURY RING.

Neolithic Dew-Ponds

beyond the dew-pond, that a small and comparatively modern building has been erected ; this was constructed to contain the gearing of a pump.

It would be interesting to know what is the actual difference of the water level now, as compared with the level at which the water stood when the cattle were able to obtain their water in the valley, and subsequently at the dew-pond.

Stonehenge lies but a few hundred yards along the road, and the fascinating and mysterious attractions of this structure are of so absorbing a nature that few of the passers-by observe the corrugations in the land which we have been attempting to describe.

At the top of the gently sloping side to this valley, and on the Amesbury side, a clump of trees may be seen ; and around this clump of trees is a low embankment not more than three or four feet high. There are many openings in the embankment, and it seems to us that this enclosure was merely a cattle-enclosure. The absence of any form of defence again shows that the land adjacent to Stonehenge was considered safe from attack. The cattle-tracks we are here describing were doubtless formed by the cattle which were herded together within this enclosure.

On some parts of the land one may see the whole side of a hill furrowed by these tracks. A curious example of this may be seen near to Figsbury Ring on the hillside above the road leading from Salisbury to Stockbridge. At the point in this road where the

Neolithic Dew-Ponds

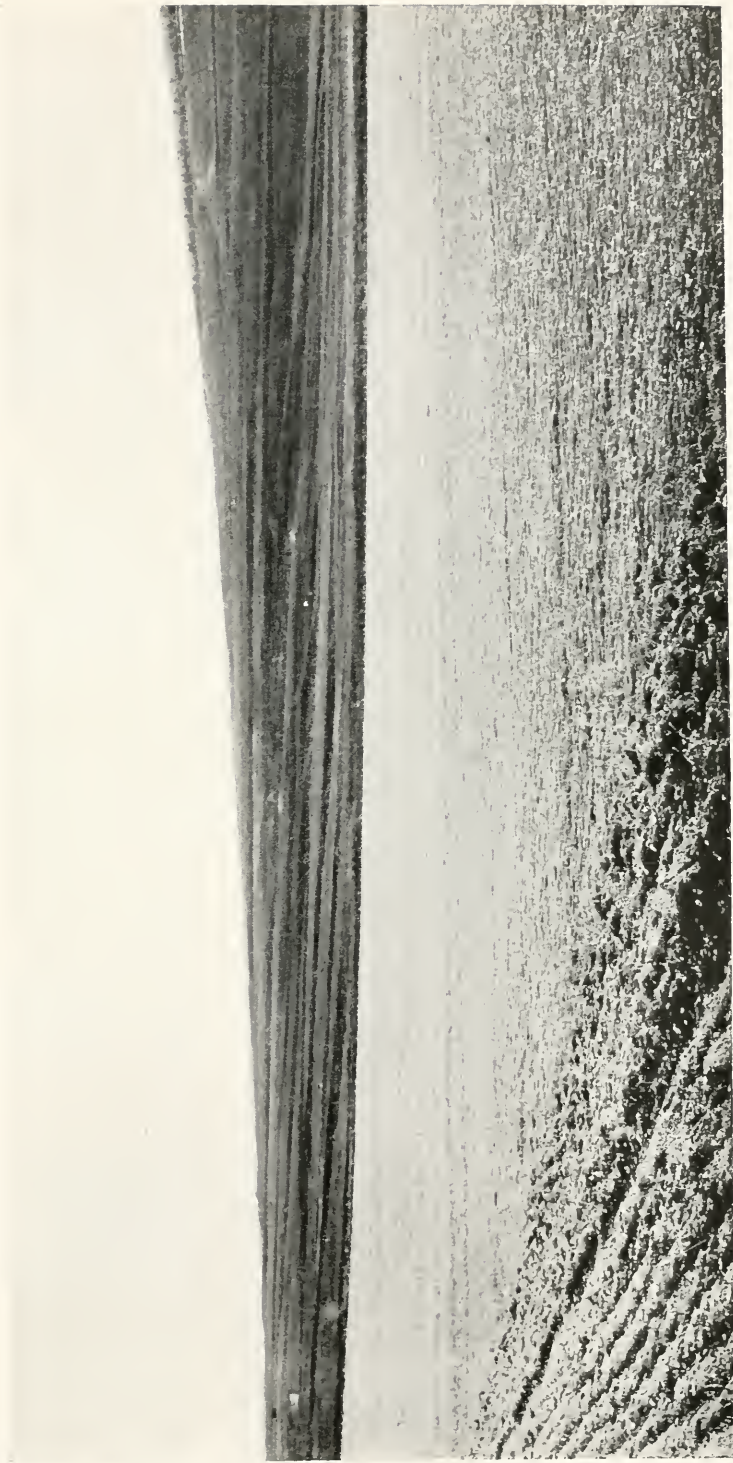
Roman road, starting from Old Sarum, strikes the one to Stockbridge, these scorings are particularly well marked and extensive.

Figsbury Ring is but a quarter of a mile north of the Stockbridge Road, and it seems possible that these corrugations of the land indicate that the cattle were contained within the Ring.

Figsbury Ring is of the same class of settlement as Old Sarum ; that is to say, there is a central citadel defended by a surrounding trench ; beyond this trench there is a flat terrace of land, around which again is another encircling entrenchment.

The broad ways which lead through the outer encircling entrenchment to the flat terrace of land seem to us to indicate clearly that they were so constructed to admit herds of animals ; whereas the approaches to the central citadel from the flat terrace are comparatively narrow, as at Old Sarum. We are strongly drawn to the conclusion that the flat terrace of land contained between the outer and the inner trench around the citadel was entirely given up to the herding of the animals, and that the humans alone occupied the citadel. By this arrangement, which is clearly indicated by the different widths of the openings, the animals upon which the life of the humans depended would be always under observation.

Unfortunately, the land immediately surrounding and within Figsbury Ring has been brought under cultivation, and it is therefore impossible to say with



XXV.—DISTANT VIEW OF CATTLE-TRACKS NEAR FIGSEURY RING.

Neolithic Dew-Ponds

certainty that the cattle-tracks, which are so apparent close to the road, did ultimately lead to Figsbury Ring.

In conclusion we may observe that the trenches, which are marked upon the Ordnance Surveys, and which are described as ditches, are in no way connected with any form of defence.

A more careful inspection than we have been able to bestow upon the subject will, we fancy, prove that there is a definite connection between the cattle-tracks and the various camps in the immediate neighbourhood of which they are generally found.

IV

ST. MARTINSELL HILL

ST. MARTINSELL HILL is a great chalk promontory jutting into a plain. At its base is the village of Oare near Marlborough. St. Martinsell Hill, Oare Hill, and Huish Hill together form a great amphitheatre, the steep sides of which rise some 400 feet or 500 feet above the underlying plain.

We here find an excellent example of the means adopted by neolithic man to preserve and maintain the community.

Approaching St. Martinsell Hill from the south we see that there is only one natural way up its steep sides; but even here the pathway to the summit is worn into steps as being the only secure method of reaching the top.

At the foot of the hill and on either side of the pathway we may see the wolf-platforms. Those lying to the east of the path are constructed in tiers; some three or four Titanic steps guarding the approach on this side. These steps are thirty to forty feet wide, and the sloping face is but little less. On the west of the path is one great platform scooped out of the face of the hill, on which some fir-trees are now growing. Near the summit of the hill the ground is pitted with small cup-shaped depressions, marking the sites

Neolithic Dew-Ponds

of prehistoric dwellings. Situated as they are, they guard the entrance to the citadel, at the farther end of which a great earthen embankment has been piled up. On the eastern side of the summit a level platform has been constructed as though to withstand the attack of wolves which may have climbed the steep side from the arena within the amphitheatre. The view from the summit extends away over plains and downland to a distant blue horizon, which is merged into the sky and cloudland of the heavens. Each headland standing out in this vast view shows the sites of other settlements.

Standing within the citadel a large circular depression, like a deep saucer, some seventy or eighty feet in diameter, is very clearly seen. As the ground on which this depression was excavated was not level, the excavated earth has been thrown up in such a manner that the brim is level all round. This depression marks the site of a dew-pond. It is now dried up, but it is as old as the earthen embankments of the citadel in which it is situated, and forms an essential part of the scheme.

Proceeding along the saddle of the down we come to the entrance to the citadel through the great embankment at the further end. In the ditch beyond, from which the earth was excavated to make the embankment, the ground is pitted, again showing that this entrance was also guarded.

This, however, is but the first of a series of defences

Neolithic Dew-Ponds

on the north. A short distance in front of the main embankment an entrenchment has been cut across the ridge, and perhaps one hundred yards beyond this there is a low embankment, with a ditch beyond it.

An interesting point in this low embankment is to be found in the fact that there are clear traces that it was patrolled, for a small worn path has made a slight depression on its upper surface. Seeing that this low embankment runs from one steep side of the down across the saddle to the steep descent on the opposite side, it could not at any time have served as an ordinary pathway.

We may perhaps pause here for a time to picture to ourselves the weird sight of our early ancestor, long-haired and dressed in wolf-skins, armed with flint implements, patrolling this low embankment. On one side of him was the citadel, and on the other were the fortified enclosures where the herds were kept. During the dark nights he must have heard the howling of the wolves, and the frightened noises from the herds, and in the dim distance he could see, no doubt, the firelight from other settlements. From our over-civilised point of view, the life may appear a hard one, but it was probably a healthy one for the strong, and the weaklings died early.

Continuing along the ridge, certain winding paths may be noticed which have a tendency to converge. By following the track of these paths it will be found that they lead into a country lane descending on the

Neolithic Dew-Ponds

eastern side of the slope, and in places cut twenty or thirty feet deep.

As soon as we saw the convergence of these winding tracks leading to the deep cutting of the lane, we recognised that these were the tracks left by the herds going towards a cattle-way leading to the plains.

We next looked for, and found, a confirmatory piece of evidence which we knew from previous experience would be present if this country lane had been, indeed, a neolithic cattle-way. We sought a cup-shaped depression in the ground at a point at the top of the lane before it dispersed itself into the radiating paths. There, exactly in the position anticipated, the depression was found which marks the site of a cattle tally-house.

It is interesting to note from what was subsequently observed in connection with the settlement on Huish Hill, that this particular cattle-way leads down to the grazing-grounds lying to the east of the settlements.

It will be presently demonstrated that considerable confusion resulted from the mingling of the herds which descended respectively from St. Martinsell Hill and from Huish Hill, and that neolithic man had to re-arrange the grazing-grounds for the herds which were encamped on Huish Hill.

Continuing our journey along the ridge, and leaving the cattle-way and the cattle tally-house on our right, another depression in the ground is found. This de-

and Cattle-Ways

pression does not possess the appearance of having been the site of a dwelling, owing to its considerable size and depth. Such depressions may be seen in neolithic settlements, and they generally have a low mound or hump across the centre, thus roughly dividing the depression into two compartments. The frequency with which these humped depressions are found wherever neolithic man has settled, proves that they served some purpose in his economy, and the absence of any cartway leading into the pits precludes the idea that they are of modern origin.

At the margin of the pit in question there is a faint indication of a worn path leading away from the raised hump in the centre. It leads to the edge of the steep side of the down, and here the excavated earth had been tipped.

These pits are, in fact, flint quarries, and the hump was left as a means of ingress and egress.

Before the age of metal, flint working must have been one of the most important industries, for out of this material most of the primitive tools had to be wrought. It is therefore not surprising that flint quarries should be discovered on most hilltops where neolithic man had settled.

It is also interesting to note that the surplus chalk and unsuitable nodules of flint had been tipped where it made the steep sides of the downs still steeper, and so added additional protection against any assailants.

A little farther on is another dew-pond, in this

Neolithic Dew-Ponds

case still containing water. By the side of this second dew-pond is a straw-thatched shepherd's cottage, where the kind wife of the shepherd made some tea with the water drawn from the dew-pond, and her young daughters gathered a dishful of wild raspberries for us. Not the least of the pleasures in roaming over the wild downs is the pleasant rests we make in the cottages of these kind shepherds, who are as pleased to extend their hospitality as we are to accept it. They refer to the larger embankments as the "giants' graves," or the great wolf-platforms as the "shepherd's steps"; but they know nothing further about them, except that they existed beyond the memory of man.

A short distance beyond the garden of the shepherd's cottage may be seen the outlines of a great encircling earthen embankment and a ditch on its outer side. Within this enclosure the herds were driven for protection during the night. The circumference of this enclosure must be at least a mile and a half, and it surrounds a level tableland with steep sides to the downs on almost every side. On the north, however, the ground falls away gradually, and here on the northern side the embankment and ditch are pierced by sundry openings. Opposite each opening is a field with an old hedge growing on the top of a bank. It seemed to us as we looked down upon these fields divided by the banks that they may have been small grazing-grounds for the herds near home. There must have been times of danger when it would

and Cattle-Ways

have been inadvisable to allow the herds to roam in the valleys even by day, and the necessity of securing small grazing-grounds near the encampment is apparent.

By the side of these small grazing-grounds a spur pitted with the sites of dwellings runs out from the great promontory. From the position of these dwellings it appeared as though the occupiers of this small outlying camp were the watchmen of the grazing-ground. Only by the alertness and watchfulness of the men could the cattle be protected, and every precaution appears to have been taken to save the herds from the wolves.

All these works exist on the eastern arc of the great amphitheatre, and the western arc is in sight, a mile away, on our left.

In the distance we have seen great furrows scoring the south side of the western arc known as Huish Hill, but, viewed as we saw them, we had no conception either of their extent or depth. The furrows certainly did not appear to have been constructed for any defensive purpose, and it was not for some time after we had been examining them on the spot that their true meaning dawned upon us.

To pass from the eastern arc to the western it is necessary to cross the road leading from Salisbury to Marlborough over Oare Hill. This road passes through a deep cutting, and, as we scrambled down one side and climbed up the opposite, we were immediately struck by the fact that a second deep cutting

Neolithic Dew-Ponds

was scored in the ground running parallel to the road.

At a little distance beyond this was yet another trench, perhaps twenty-five or thirty feet deep, with particularly steep sides. Proceeding along the edge of this trench in a south-westerly direction, we found that it branched off into two. Each branch curved down the hillside to the plains below.

These trenches, without any embankments on either side to account for excavated earth, are cattle-ways. Occasionally other cattle-ways cut obliquely across the great one, and we were considerably perplexed to find that these oblique cattle-ways were not more than about six or eight feet deep. If both were cattle-ways it appeared as though the cattle travelling along the shallow trenches would have to make a mighty leap across the great ravine in order to continue their journey along the trench by which they were travelling. Hence the perplexity, for there was no evidence to show that the herds had clambered down the steep sides of the deep ravine from the shallow trenches above. We were therefore determined to follow up one of the shallow trenches in order to seek a solution of the problem. Our bewilderment was increased when we found that the end of the trench, where it opened upon the tableland at the top, had been deliberately blocked, and that in other cases the shallow cattle-ways had been likewise blocked at points just before they reached the deep one.

and Cattle-Ways

We presently realised that, for some reason or another, it had been found necessary to divert the herds from their accustomed tracks which led down to the arena contained by the amphitheatre, and to conduct them into others which opened out upon the level grazing-grounds lying to the west.

Cattle had been herded here just as they had been on St. Martinsell Hill. It must have been found that these herds when they descended into the plains by the old or shallow cattle-ways mingled with the herds which belonged to the inhabitants of St. Martinsell Hill, and in order to avoid the continuance of this confusion it was obviously determined to block up the old cattle-ways, and construct new ones, which conducted the herds down to the plains in the opposite direction. This explanation completely accounts for what we had discovered, and if any one cares to ramble over Huish Hill, bearing our solution of the difficulty in mind, he will find how carefully neolithic man took all the necessary steps to carry out the alteration.

Apart, however, from the solution of the difficulty, any one must be very forcibly struck by the age-long custom that must have continued century after century of driving the herds over the same road.

Even if one accepts the view that man may in the first instance have indicated by a cutting in the ground the line he intended his herds to follow, and making allowance for the deepening of the cutting by the washings of the storms and rain, it still remains that the

Neolithic Dew-Ponds

trampling feet century after century could alone satisfactorily account for the depth of something like twenty-five or thirty feet of the great trench.

In conclusion, we may say that we know of no more pleasant occupation, or healthier one, than to leave the high roads and strike inland and upland and trace out the works of neolithic man. It is safe to say that nowhere in the high lands of the downs can the explorer find himself without the evidence of the great earth-workers. When the eye has once become accustomed to their works, it is always possible unerringly to detect their labours. Sometimes it may be only the slightest indication on the surface of the soil; but at others it may be that neolithic man has hewn great gaps through the downs, like gigantic railway cuttings, and the course of the country lanes occasionally has its origin in a neolithic cattle-way, or runs along one of the level wolf-platforms.

The hills and the plains speak eloquently of the prehistoric past to those who are willing to forget their own mode of life in the interpretation of the writing on the scroll which they spread before us.

V

THE DEVIL'S DYKE, NEAR BRIGHTON

AMONG the many mysteries which the Neolithic World has left, the Devil's Dyke is one of the strangest. At the top of the downs above Brighton starts a great gorge, which takes a winding course, and debouches upon the plain known as the Sussex Weald, about a mile away. Although it is obviously artificial, the first impression that it gives is that it is too vast to be the work of human hands. To this bewilderment another succeeds: what was the purpose of all this labour?

There can be no doubt that Neolithic Man took a natural valley, and shaped it to serve a purpose which we hope to demonstrate.

He shaped it by shearing off all irregularities and roundness from the surface of the downs on both sides of the valley until they presented the unnatural smoothness, steepness and regularity which we see to-day. There is nowhere any evidence of the chalk which was dislodged having been removed: somehow or another it was disposed of within the limits of the Dyke itself.

For what purpose was this done? The idea that the work was strategical in character appears to us

Neolithic Dew-Ponds

not less preposterous than the suggestion that the whole was excavated from the solid chalk.

We shall only understand its significance by considering its environment for miles around. At the upper end of the Dyke are the remains, only occasionally well-marked, of a very extensive camp, standing on the edge of the downs which on that side descend sharply to the Weald. The numerous cattle-tracks leading down to the Weald suggest that this camp was a great cattle-compound in spite of the comparative absence of wolf-platforms. Our interpretation of these works is that the cattle, when set free from the compound, found their own way down the slopes by their cattle-tracks to their grazing-grounds in the Weald, the Dyke itself being the only ascending way.

Passing now to the lower end of the Dyke, we find that the natural outline of the downs where they reach the plain would assist the herdsmen in rounding up their cattle and driving them to the entrance. This view is further supported by observing the cattle-tracks which converge on it.

This consideration of the surroundings of the Dyke shows that it served the purpose of a gigantic ascending cattle-way. In the morning the cattle would descend in single file from the compound above by the many small ways already referred to. In the evening, scattered in the plain, it would be difficult to distribute them evenly among these ways for their return, but easy to round them up, driving them all

and Cattle-Ways

into the angle of the hills and so up the great Dyke Road. The constant trampling of herds would in time form a miry V-shaped depression at the bottom of the valley along which they could only pass with difficulty. This difficulty the earth-workers overcame by cutting off the excrescences from the sides of the downs, and shovelling the material thus obtained into the bottom of the V-shaped depression. Thus they constructed a broad flat road which, owing to the steep gradient, would have been well drained, and, incidentally, made the great Dyke.

In such a vast ascending cattle-way one naturally expects to find a correspondingly important cattle tally-house.

To start from the top of the downs on a journey to recover missing cattle in the plain below would obviously be inconvenient, and the tally-house must be sought at the lower end of the Dyke.

Lying in this position, at a point perhaps three-quarters of a mile from the entrance to the compound, is a low embankment, and this, we think, was a tally-house. The embankment lies in the middle of the road, forming three sides of an oblong, about thirty paces by thirteen. It is not so constructed as to entirely block the way, but just sufficient space is left on either side to allow the beasts to pass by in single or double file. Thus two streams of cattle could be counted simultaneously.

On the level ground at the top, hidden amongst

Neolithic Dew-Ponds

the gorse bushes and outside the fortified compound, is an ancient dew-pond. Thus the cattle could be watered just before entering the compound for the night.

We know of no other cattle-way so perfect as the Devil's Dyke, and we see in it an impressive testimony to the vitally important position which the herds occupied in the economy of Neolithic Man.



XXVII.—DOUBLE RIDGEWAY.

VI

MALVERN

A RANGE of granite hills about one to two miles across runs approximately north and south for about nine miles, with West Malvern lying on the west and Great Malvern on the east. From the hilltops you may, on a clear day, see into “twelve fair counties,” and with a good glass you can see Snowdon and the Bristol Channel, the Dursley hills in Gloucestershire, and Bardon Hill in Leicestershire. The range of the Malvern Hills rises abruptly from a great plain whose levels extend eastwards until they are lost in a far-distant horizon. Roughly parallel ranges of low foot-hills show themselves on the west before the surrounding plain is reached.

This island of hills naturally attracted [the men of

Neolithic Dew-Ponds

a time when the plains were only accessible by day, and the traces of his manner of life there are most interesting. Unfortunately we are here upon the granite and not the chalk. With no metals at his command, neolithic man could not work in granite with the same freedom as on the chalk downs in the southern counties. Where it has been necessary, as in some of his trenches and paths, he smashed his way through the rock, but generally he worked in the loose material of the surface. Thus, though much remains, much is lost, for the weather and the worms have smoothed out the details of his work. The worms have made the dew-pond impossible, and the routes of his cattle are almost filled up. The granite did not lend itself to the making of wolf-platforms; and naturally, we find no flint quarries.

But what remains gives us an unusually vivid insight into his life. Without the wolf-platforms his herds were insufficiently protected against the wolf. Without flints, or having only those which had been imported, he was inefficiently armed, and without the dew-pond at hand his camp could not stand a long siege.

In what we actually find, we can trace the fact that fear was his constant companion on the Malvern Hills.

His chief settlement was a great camp on the Herefordshire Beacon, one of the most southerly hills of the ridge. The whole surface of the hill has been

and Cattle-Ways

taken in hand, and rough-hewn to serve his needs. The trench and embankment work has not the linear continuity of that in the chalk: it has been necessary to circumvent the outcrops of granite, but it rises tier above tier until a most formidable stronghold has been constructed. The most interesting point is the minuteness of the area contained in the citadel at the top. Unlike the spacious citadels upon the chalk, it is too small for defence for more than a few hours. There are two large cattle-camps, extending like wings, one to WSW. of the central stronghold, and the other to ENE., each enclosed by a double ring of great trench and embankment work.

Looking at this camp from a point some miles to the north of it, one is impressed by the dark and forbidding aspect of the place. The upper part of the hill appears to have been hewn into three great steps, the outline of which shows itself boldly against the sky, and the highest step is crowned by the upstanding citadel. These northern slopes are in shadow; the edges of the embankment just catch the rays of the sun, and stand out as horizontal lines of light against the shaded background.

Approaching it, one sees that a deep modern cutting has been made which divides the Herefordshire Beacon (which is occupied by the camp) from the hills immediately to the north of it. This cutting was made in the middle of the last century, and a road passes through it, running east and west. On the northern

Neolithic Dew-Ponds

side of this cutting may be seen the neolithic road which runs along the crest of the hills, and above the cutting on the southern side its continuation may be seen running up to the camp. We walked round and joined this path. Above this cutting, although the path must have been practically untraversed for half a century, it is as clearly marked as possible by the close fine turf which always characterises the ancient ways. It passes through an entrance in the embankment at the extreme north of the northern cattle compound; but the path is not indented into the ground, the entrance is steep—circumstances which undoubtedly indicate that it was not used by cattle. This led us to seek for the constructed cattle entrance, and we determined to follow the western external embankment until we came to it. At first we found none, but we observed that near the base of the citadel a way with a gentle slope had been made from the outer trench leading up to the contained cattle enclosure. We now sought a cattle entrance to this trench after it winds round to the west of the citadel, and duly found it in such a position that the cattle could either be driven directly into the southern cattle enclosure, or turned into the trench, and so driven round the base of the citadel and up the slope to the northern enclosure. These cattle enclosures afford an evidence of the immensity of the labour expended in building the camp. In each case the contained area is fairly smooth—as though the outcrops of granite and even

and Cattle-Ways

the ridge of the hill itself had been artificially removed or levelled up by the earth excavated from the trenches. This is the only hill in the neighbourhood which is possessed of any level ground, and it is difficult to believe that it has not been deliberately made. Together these two cattle enclosures cover a large area. The circumference must be quite a mile in length.

The citadel stands between the cattle compounds, and dominates them both. It is at a considerable elevation above them, and surrounded by rings of trench and embankment. On the south-east aspect some six or seven tiers may be counted, and the area contained becomes smaller and smaller until it is reduced to a rough parallelogram about thirty yards by fifty yards.

The problem of a water-supply was very simply solved in this camp. On the slopes between the camp and the hill on the east of it, springs of water were to be found, which even now help to fill the reservoir which lies at the foot. On the eastern side of the camp there is a way through the lowest embankment from which an ancient path leads in the direction of the springs.

The hostile aspect which the camp presents when viewed from a distance is not dissipated by a nearer knowledge of it. It speaks of gloom in every recess, and we turned back, oppressed by the sullen genius of the place.

The neolithic work which is most distinctive of this neighbourhood is to be found in the system of

Neolithic Dew-Ponds

roadways. Two parallel tracks within a few feet of one another run from end to end of the ridge, and crossing the ridge are many smaller roads running at right angles to the high tracks.

This high-road is most interesting. Its traces are first seen near the northern end of the range in the valley to the north of the Worcestershire Beacon at a point from which the plain can be reached easily either on the east or the west. Thence it runs nearly on the crest to the extreme south of the range, formerly entering and still leaving the camp on the Herefordshire Beacon on its way.

Although it adheres closely to this general line, the particular route chosen was dictated by fear. This fear was the fear of being discovered by exposure on the skyline.

Tracing it for mile after mile, one sees how easily it might have been carried along the very top of the ridge, and yet one finds that it has been made laboriously a few feet below, and to the eastern side of the crest. The open plain on the east does not seem to have been dreaded by prehistoric man, for that could be watched, but he feared the folds of the hills on the west, and from that direction he was hidden while passing along his high-road.

The idea that this labour was incurred only to secure the power of secret concentration for the purpose of attack or defence, does not entirely commend itself to us.

and Cattle-Ways

Nor is the suggestion that the object was to secure shelter from wind in this elevated position entirely satisfactory. For in that case, and granting that two roads had to be made, why was not one constructed on each slope of the ridge so that one should always be on the lee side?

It seems much more probable that here, at all events, it was never really safe for neolithic man to expose himself on the skyline, that he had to be always on the alert against his neighbours, and that he spent a furtive existence when once outside his great entrenchments.

However, the strangest point about this route is its doubleness. As we have said, there are really two high-roads, parallel, and within a few feet of one another. This double condition exists over most of the distance, about four miles, from the northern termination to the great camp on the Herefordshire Beacon. It is not, however, double over the whole of the way. There is one section, perhaps half a mile in length, where the two roads have coalesced into one, and after leaving the camp it is continued in a southerly direction to the end of the range, as a single road.

Why make *two* roads? Their appearance suggests that they were intended for pedestrians, and not for cattle; the section of the road which is single negatives the idea that, as in the case of the ascending and descending cattle-ways in connection with the camps, it was necessary to prevent herds from intermingling.

Neolithic Dew-Ponds

The problem appears insoluble to us, and is an example of the many unanswerable questions which meet us in exploring the works of neolithic man. Frequently it is impossible for us to divine his purposes or to follow his thoughts.

*“Thy Mother Nut . . . giveth unto thee a path in the horizon
to the place where Rā is.”*

From texts inside the pyramid of Pepi, B.C. 3233.
Quoted by Dr. WALLIS BUDGE, in “A History
of Egypt” (1902), vol. ii. p. 106.

VII

FIRLE

IN the autumn of 1906 Mr. G. G. T. Treherne and one of us found a curious earthen structure on the top of Firlé Down in Sussex. Owing to its inconspicuous appearance, it has previously escaped observation.

Before attempting to describe it, we desire to point out that a period must have existed before man had devised any method of measuring time. This earth-work, whether by accident or design, supplies a method of doing so.

Early man naturally measured the year from the ripening of the crops of one year to the corresponding period in the succeeding year. Thanks to the investigations of Sir Norman Lockyer and Mr. Penrose, it has perhaps been established that this system of measuring time gave the early part of May as a starting point for the year in ancient Egypt, as it had been in Chaldea in a still more remote period. Sir Norman Lockyer considers that some of the stone alignments on Dartmoor and elsewhere are directed to the point on the horizon where the sun rose in the early part of May. At Stonehenge, not only is the May year indicated, but also the midsummer solstice. It is interesting to find that in Scotland, even at the present

Neolithic Dew-Ponds

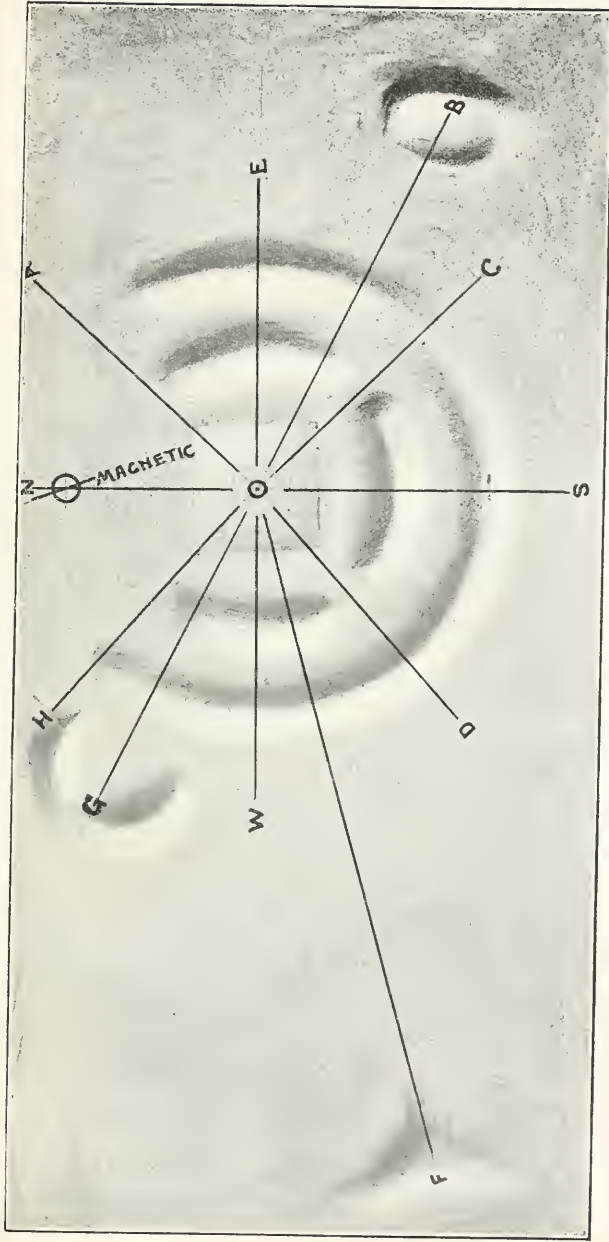
time, the quarter days fall in accordance with the old May year. In England the dancing of the girls round the maypole and the decking of the trappings of the horses on the first of May are possibly survivals of the May year festivals. The custom of passing the wine around the table in the direction of the sun's course may have an ancient solstitial origin.

We find on Firlé Down what appears to be an extremely early and complete method of observing the position on the horizon when the sun rose and set in the early part of May, and also its rising and setting during the midsummer and winter solstices.

Lying on the top of Firlé Down may be seen a segment of a circular embankment rising only some eighteen inches or two feet above the general level of the ground. The diameter of this circle is about ninety feet; it may have been a complete circle when it was originally constructed, but there is evidence that a portion of it has been worn out of recognition by wheel traffic. Within this circular embankment there remain three segments of a concentric circle of approximately the same elevation as the outer circle, and about forty-five feet in diameter. In the centre of this inner circle, a square depression, the sides of which measure 27 feet, has been made concentric with the raised circles surrounding it.

At points lying outside this design are three small subsidiary figures.

We append a diagram.



XXVIII.—PLAN OF EARTHWORKS ON DOWNS, NEAR FIRLE, SUSSEX.

If a line OA be taken from the centre of the square O through the NE. angle of the square the direction is found to be N. 48° E., and indicates the point on the horizon where the sun rose on the longest day of the year, *i.e.* during the mid-summer solstice.

The line OH from the centre of the square through the NW. angle of the square has the direction N. 48° W., and points to the horizon when the sun sets on the longest day.

The line OC from the centre of the square through the centre of the SE. gap of the inner segments has approximately the direction S. 48° E. This cannot be very accurately defined; but it may indicate the point on the horizon where the sun rose on the shortest day of the year, *i.e.* during the winter solstice.

The line OD from the centre of the square through the centre of the SW. gap of the inner segments appears to have the direction S. 53° W., and indicates the point on the horizon where the sun set on the shortest day.

The line GOB passes through the centre of the square and the centres of the two outlying figures, and has the direction S. 62° E. and N. 62° W., and indicates the points on the horizon where the sun rose and set in the first week in May. This line appears to refer to the old May year, which was in vogue before the solstitial year.

Neolithic Dew-Ponds

By taking the diagonals from the centre of the square through its north-west and north-east angles, and producing them to the horizon, we obtain the positions where the sun set and rose on the longest day of the year. By taking the lines from the centre of the square through the centre of the gaps of the inner circle (which do not correspond with the southern angles of the square), and producing them to the horizon, we obtain the positions of the rising and setting sun during the winter solstice. By taking the line from the centre of the crescent-shaped mound lying to the north-west, to the centre of the oval mound lying to the south-east, we find that it passes through the centre of the square. This line gives us the position on the horizon of the rising and setting of the sun at the beginning of the old May year.

It has been calculated that the foregoing orientations coincided with the rising and setting of the sun at these special times of the year at about 1900 B.C.

Such an extraordinary combination of solstitial bearings seems almost to preclude the element of chance. Its position amidst tumuli and other neolithic works certainly lends some probability to the antiquity of the structure, though, of course, it does not preclude it from being a comparatively modern work. If it does belong to the neolithic epoch, it is certainly an interesting discovery, for, as an observatory, it is more complete than Stonehenge or any other monument in this country of a like antiquity that has yet been discovered.

and Cattle-Ways

The square in the centre is found to have its sides nearly to the true (not magnetic) cardinal points.

We should, moreover, like to point out that on the assumption that the structure is an ancient observatory, the astronomer, while squatting in the centre of the depressed square, would have his eyes on a level with the ridges of the enclosing circles. These circles were of equal height, and so long as he had the ridges of both of them in line he would possess fixed points by which to determine a level artificial horizon. The use of the gaps in the inner circle now becomes clear. Had the inner as well as the outer circle been continuous, the observer would have found difficulty in making certain that the tops of the two mounds were on a level with his eye. A gap in the inner ring would enable him to make sure that they were so, and a small mark placed on the outer ring would enable him to make sure that he was looking in the right direction. The arrangement would resemble the sighting of a rifle, the V-shaped backsight representing the gap in the inner ring, and the foresight the mark on the outer ring. But, in this case, the rifle would be fixed, and the man adjusting his line of sight to it, instead of *vice versa*. Bearing in mind the limitations of a neolithic astronomer, we cannot suggest any improvement.

On the other hand, certain difficulties present themselves to our minds, and we are anxious not to lay more stress on this curious structure than the facts warrant.

Neolithic Dew-Ponds

The grass with which it is overgrown does not look like the ancient down-turf which has not been disturbed since times of antiquity. Hence we regard it with a certain sense of suspicion, which is unfortunately further intensified by a tradition which exists in the neighbourhood. The belief in the minds of the shepherds, and the locally accepted explanation of the mounds which we have been describing, is that they have been left upon the site of an old windmill which no longer exists. Although the rustic mind is restless until it has been satisfied by some explanation of the apparently incomprehensible, yet it is never safe to reject summarily a local tradition of this character. On the other hand, when we find so many astronomical bearings accumulated in connection with these mounds it is certainly dangerous to attribute them to accidental coincidence. We should do so without hesitation if we found that only one, or even two suggestions of astronomical significance could be traced. But here the cumulative effect is so great that, if the observations are correct, coincidence is ruled out of court. Unfortunately the remains are so ruinous that it is a matter of great difficulty to obtain really accurate measurements.

Even this does not show the full complexity of the matter. Three or four miles away on Mount Cabourne, is another very similar depressed square surrounded by a concentric raised circle of much the same dimensions, and at hand are other outlying works.

and Cattle-Ways

Up to the present no investigation has here been made, but there is no astronomical significance on the face of it, and had we only had before us these works on Mount Cabourne we should have accepted the local tradition of the shepherds without hesitation. Even here the square-and-circle is not quite free from astronomical associations, for close by are two large raised circles in the turf, one of them traversed by a mound which, passing over the centre of the circle, runs true east and west. These circles are certainly free from the taint of the windmill, and as certainly have some bearing upon astronomy.

Thus we are compelled to leave the matter in doubt, only hoping that it may be submitted to a searching investigation by some one possessed of the necessary combination of the skill of the antiquary and of the astronomer.

VIII

WILLERSEY HILL

PERHAPS nowhere in England are the cattle-ways so clearly visible as on the chalk downlands; but the evidence of the age-long traffic of the herds by their accustomed routes is perhaps more clearly shown where their feet have worn down—not chalk, but a hard rock, over which they must have passed for an unknown period.

On the borders of Gloucestershire and Worcestershire stands Willersey Hill, on whose wind-swept top the trenches and embankments of a neolithic encampment can clearly be traced.

An almost unfrequented road leaves the London Road on Broadway Hill, and passes over Willersey Hill to Saintbury and the village of Willersey, which lies in the valley some two to three miles away from the encampment.

After leaving the encampment it may be noticed that the grass waste land on the northern side of the road is deeply furrowed, and that the furrows have a tendency to run parallel to the road, and all lead up to the encampment at the top of the hill, which is skirted by the road.

On this waste land a few inches of rich humus lie

Neolithic Dew-Ponds

on the top of the hard oolite formation below. The local stone for all building operations has been for centuries this oolite stone, and the homely Cotswold Tudor houses in all the villages testify to its enduring properties. In this waste land at the side of the road the parish of Willersey has opened up a stone quarry, and the face of the quarry cuts directly through these furrows.

Here in section we have a view of these furrows. Had they been a natural formation, then we should have seen the strata of the rock formation curved to follow the contour of the surface; but here, instead, we find that the furrows cut through the strata. These furrows are most certainly cattle-tracks, and lead to and from the encampment at the top of the hill to the grazing grounds below.

On a close inspection of the section of the cattle-tracks, we find that the herds have worn down the rock to a greater depth than is apparent in the undulating grass-land on the surface. The undulations on the surface may perhaps measure about six feet from the general level of the ground to the bottom of the grass-grown depressions, but, when we examined the section of the rock, we found that below the grass surface of the depressions an accumulation of loose stone had collected, and that the original depth of the depressions had once been perhaps four feet more. The depth therefore of these cattle-tracks must have been about ten feet, and this depth, it must be borne

Neolithic Dew-Ponds

in mind, has been worn out of the solid rock. Owing to their position on the top of the hill, the effect of water running along their channels must have been quite inconsiderable. We do not like to hazard a suggestion as to the time that would be required for the feet of the herds to wear down this hard oolite stone even by one inch, and one can only realise that, to measure the age-long traffic over these rocks by centuries, must be to underestimate their antiquity; the age must be measured by thousands of years.

On the busy pavements in the city of London, where an artificial stone has been used, the surface has only worn down an eighth of an inch in twenty-five years; at this rate it would take one hundred years to wear down the surface half an inch.

The oolite stone is very hard; but if we allow two inches in one hundred years as the result of the wearing effect of the horned hoofs, it would take six thousand years to trample out these cattle-ways on Willersey Hill.

Then for long centuries the slow process of gradual accumulation of broken stone must have been in progress—since the time when the trenches were used as cattle-tracks—and now the surface of the broken stone is covered with soil. We do not think that we are overestimating the antiquity of these trenches, and the encampments to which they lead, when we assume that they probably may be ten thousand years old.

An hereditary instinct of the herds themselves has

and Cattle-Ways

a curious bearing upon the subject. Even at the present time both cattle and sheep if left to follow their own devices will leave the rich and sheltered pastures of the valleys and wander off in the evening to the bleak and windy heights for the night.

This natural and indelible fear of the plains during the night goes far in support of our theory that the marshy lowlands were in early neolithic times uninhabitable for either man or beast.



XXIX.—CATTLE-TRACKS ON WILLERSEY HILL.

NOTE.—The cattle-tracks may be observed against the sky-line.

When the poor and needy seek water, and there is none, and their tongue faileth for thirst, I the Lord will hear them, I the God of Israel will not forsake them. I will open rivers in high places, and fountains in the midst of the valleys: I will make the wilderness a pool of water, and the dry land springs of water. I will plant in the wilderness the cedar, the shittah tree, and the myrtle, and the oil tree; I will set in the desert the fir tree, and the pine, and the box tree together. . . .

ISAIAH xli. 17-19.

IX

DEW-POND EXPERIMENTS

THE general interest that has been shown in the theory of dew-ponds which we advanced in the first edition induces us to give the results of certain experiments which we have carried out since its publication.

We held, and we hold, that experiments conducted on a laboratory scale would not be conclusive, because, except on a very still night, the air passing over a small chilled surface would not remain in contact with it for a sufficient time to become itself chilled. Furthermore, even if chilled, it would not deposit its moisture in the prepared receptacle. We, therefore, determined to construct a large dew-pond, in a thoroughly scientific manner. Had we been able to carry out our original design we believe that it would have been successful even without the further improvements which experience has shown us might have been introduced.

At first we endeavoured to obtain a patch of land at some fair elevation, but, as this was not practicable in any convenient locality, we finally made up our minds to be satisfied with a low-lying site. We trusted to our methods in the construction of the dew-pond to overcome this disadvantage, and considered that if it succeeded in such a situation, the

Neolithic Dew-Ponds

general applicability of the system would have been more conclusively demonstrated.

For the reasons already given, we determined that our pond should have a large superficial area. We began by excavating the ground over a space 100 feet square, thus obtaining a superficial area of 10,000 feet. The excavation was carried to a uniform depth of 1 ft. 6 in., and a layer of 4 in. of concrete was laid over the whole. Upon this we put a coating of pitch to stop any moisture from below from penetrating through the concrete to the layer of non-conducting material that we intended to lay. In order to form a suitable bed for the non-conductor, we spread dry sand over the tarred surface.

After much consideration we selected mica, as used for boiler-covering, for our non-conducting material. This was specially manufactured for us in blocks resembling paving-stones, 2 ft. square, and 2 in. thick. Our original intention was that these blocks of mica should be made with a very thin, impermeable, white enamel, in order to reduce to a minimum any heat-retaining material on their surface, and we intended to run asphalt only into the joints between them.

The manufacturers carried out experiments, but were not able to obtain such a coating for our blocks, and in consequence we were, most unfortunately, compelled to lay a coating of asphalt over the whole upper surface as well as between the edges. We were aware that this was an unscientific departure, but we were

and Cattle-Ways

confronted by a difficult and disappointing situation. Still we did not abandon the work, for our faith in our non-conducting layer of mica was so strong that we believed it would be sufficient to overcome the disadvantage of the asphalt covering.

Our pond was in process of construction in the early spring of 1906. After the mica blocks had been laid and covered with asphalt, we noticed in the early mornings that pools of water collected in any accidental depression in the surface of the asphalt, though not a drop of rain fell. The efficiency of the system was almost startlingly shown when hoar-frost was formed. At such times our pond looked, as one of the workmen graphically described it, "like a great window lying out on the ground." The surface covered by the black asphalt was then divided into perfectly white squares, nearly two feet across, with hard black lines, about two inches wide, dividing them. This was distinctly encouraging, for it showed that the frozen dew had been deposited upon the surface of the asphalt immediately over each block of mica, and that it was entirely absent over the joints between the blocks, where no non-conductor lay below the asphalt covering. When the hoar-frost melted in the sun's rays later in the day, we found to our satisfaction that the pond contained some hundreds of gallons of water. However, as the day wore on, this completely evaporated. Night by night we used to get our water, and day by day we lost it again.

Neolithic Dew-Ponds

Thus, in spite of its disadvantages of position and material, our pond was successful up to a certain point, and had we constructed it in the form of a funnel with a draw-off cock at its inverted apex we should have been able to collect our accumulated dew of the night into an underground tank, where it would have been preserved from evaporation during the day.

The layer of asphalt with which the bottom of the pond was covered was half an inch to three-quarters of an inch thick. Asphalt is a splendid heat-retaining substance, and if it once becomes warmed by the heat of the sun, this heat cannot, under the conditions of our experiment, be transmitted to the earth, owing to the non-conducting property of the layer of mica placed immediately below it. Thus it dawned upon us at the time that, if a first-class evaporating-basin were required, we could recommend no better method of constructing it than that adopted in our experimental dew-pond.

Now, however (spring 1907), we are seriously modifying that opinion, for the pond remains practically full in spite of the fact that there is no chance of any surface water entering it. The rain which fell into it during the winter, chiefly in October, is not disappearing, and we shall watch it during the summer with great curiosity.¹

¹ We find (August 1907) that the British Boy has invaded the experimental dew-pond in spite of all our efforts to protect it with barbed wire.

and Cattle-Ways

While we were thus occupied, Mrs. George Hubbard constructed a dew-pond on the same principle, but employed different materials, and the results that she obtained were encouraging. Her pond was 24 ft. square, with sloping sides, and its depth in the centre was 6 ft. After the ground had been excavated, it was covered with bituminous sheeting. A layer of wool lined the upper surface of this sheeting, and over the wool was another layer of bituminous sheeting supported by a skeleton of wood arranged to prevent compression of the wool by the weight of water.

In the early mornings slight runnels of water could be seen trickling down the bituminous sheeting, but the pond failed to fill. It was therefore demolished, and it was then found that vegetation had grown through the lower layer of sheeting, and that the wool was sodden with water. Its non-conducting property was therefore destroyed.

The situation of this pond was not a favourable one, and it had the further disadvantage of an overhanging tree. It was noticeable that this tree interfered with the process of radiation from the pond, and that the side thus overshadowed failed to collect dew.

We do not attempt to give an account of all our experiments, but the results we obtained in connection

In a spirit of pure destructiveness, he has pierced or torn up the asphalt in several places. Thus the water has been admitted to the layer of mica, and reduced it to a useless pulp.

Neolithic Dew Ponds

with the deposition of dew on variously coloured surfaces may have some interest. The greenness of nearly the whole vegetable world led us to consider the possible influence of colour. Roughly speaking, all vegetation is green, and especially so at that period when it is most in need of moisture. The truly parasitical plants, not relying on moisture either from the air or the ground for their sustenance, are not green; we therefore thought that a green surface possibly had some peculiar power of radiation.

We had four pans made of the same wood, 2 ft. square, painted black, white, red and green respectively, and varnished. If we placed a pan of any colour on one of our blocks of mica, we succeeded in collecting in it more dew than in any of the other pans which were placed upon a gravel path. White, on the whole, gave the best results, though green ran it very closely; black always gave the worst, and red was not much better. On putting the white pan upon a block of mica, and comparing the amount of dew collected in it with that collected by the black pan unprotected by mica, we found that the white pan collected five times as much as the black. Of course the pans were exposed on the same night, and lay within a few feet of one another.

The object of these experiments was to determine the proper colour-surface for our dew-pond, and, as a result, it was ultimately painted white over the asphalt.

and Cattle-Ways

We are convinced that, under proper conditions, dew-ponds can be successfully made, and that in certain waterless districts with a moist atmosphere, their adoption would prove of inestimable advantage. Districts exist in which the air is moist, but the ground is always hot and the moisture finds no chilled surface as a foothold upon which it can be deposited.

Consider, for instance, the case of the three islands known as the Desertas. Their nearest point is about twelve miles from Madeira, and they are close together: the largest measures about ten miles by two miles. As their name implies, they are desert islands on which we believe that rain never falls. They are streamless and springless and uninhabited, except by a few fishermen who live on the largest. These men live by water obtained by spreading out fleeces in the evening, and wringing the dew from them in the morning.

If on one of the heights in the Desertas a dew-pond of good size were constructed, a plentiful supply of water should be obtained from the moisture-laden atmosphere. Thus vegetation could be supported, and if quickly growing trees could be nursed into existence, rain would be induced to fall and a total change in the climatic conditions would result. We fail to see why the Desertas should not in time become as fertile as Madeira itself—one of the richest spots on the face of the globe.

We are aware that we have only been dealing with the fringe of a fascinating subject. If any of

Neolithic Dew-Ponds

our readers care to go into the matter more fully with us we will gladly place further information at their service. For ourselves, we are not prepared to meet the great cost which is involved in a thorough investigation.

THE END

PRINTED IN GREAT BRITAIN BY BALLANTYNE, HANSON & CO., LTD.
EDINBURGH AND LONDON

THE FATE OF EMPIRES

BEING AN INQUIRY INTO THE STABILITY OF CIVILISATION

By ARTHUR JOHN HUBBARD, M.D. (Dunelm.)

Svo, 6s. 6d. net

From the Preface: "The turning-point in past civilisation has been marked, again and again, by the appearance of Socialism coincidentally with a failure of the birth-rate. During the lifetime of the present generation these two phenomena have assumed a more and more prominent position among the races of white men, and it has been my object to show how critical the position of any civilisation is when it reaches the point at which they are manifested."

British Review.—"This striking book."

Athenæum.—"A highly interesting book."

Birmingham Daily Post.—"Here is a book which demands careful attention. There is sheer hard thinking in it."

Standard.—"The subject of Dr. Hubbard's book is profoundly interesting, and his treatment of it is severely logical."

Church Family Newspaper.—"The book well deserves reading as it sheds light on many subjects of present-day controversy, and has a healthy tone from beginning to end."

Guardian.—"Dr. Hubbard's *Fate of Empires* is a sincere treatise on a grave problem. The question which he treats is that commonly called 'race suicide.' . . . Dr. Hubbard will give the reader much matter for thought, and his central proposition is morally sound."

Globe.—"Dr. Hubbard acutely remarks that the turning-point in past civilisations has been marked, again and again, by the appearance of Socialism coincidentally with a failure of birth-rate. The most striking instance is that of the Roman Empire, but the phenomena to which Dr. Hubbard refers are almost as apparent at the present day."

Land Agents' Record.—"The work is divided into two parts, the first of which discusses the basis of a permanent civilisation. This is a marvel of cogency and close reasoning, and reminds us, from the scholarly point of view, of nothing so much as Newman's *Grammar of Assent*. We refer, of course, to its sequence of logic, for it is readable from beginning to end."

Sunday Times.—"The *Fate of Empires* is the ambitious title of a really fine book, a book which successfully rises to the height of its great argument, a volume which definitely places its author among the best thinkers and teachers of our day. It would be difficult to name any volume issued within the last ten years which contains a greater sum of fine thought, illustrated by solid knowledge and expressed in vivid and trenchant English."

LONGMANS, GREEN & CO., 39 Paternoster Row, London, E.C.
New York, Bombay, Calcutta, and Madras

THIS BOOK IS DUE ON THE LAST DATE
STAMPED BELOW

AN INITIAL FINE OF 25 CENTS
WILL BE ASSESSED FOR FAILURE TO RETURN
THIS BOOK ON THE DATE DUE. THE PENALTY
WILL INCREASE TO 50 CENTS ON THE FOURTH
DAY AND TO \$1.00 ON THE SEVENTH DAY
OVERDUE.

APR 12 1940	REC'D LD
	MAY 25 1950
	3 Oct '61 LZ
APR 11 1941 M	REC'D ED
	OCT 3 1961
	15 Jun '65 AG
OCT 2 1941 M	REC'D LD
	JUN 14 '65 - 1.PM
MAY 19 1943	
AUG 18 1947	
7 Jun '50 JG	
9 Apr '52 SA	
2 Apr '52 Lu	
25 May '57 JH	
	LD 21-100m-7,'39 (402s)



100-100-100

